ABSTRACT

HUBER, MARY S. The effects of a six-week structured stretching program on flexibility and self-esteem in 65-95 year olds. M.S. in Adult Fitness - Cardiac Rehabilitation, 1986. 66 pp. (Dr. Phil Buckenmeyer)

This study was conducted to determine the effects of a structured stretching program on flexibility and self-esteem on older adults. Certain variables were chosen to be examined so that an effective exercise program for the elderly could be established.

Thirteen females and two males from the Carroll Heights Apartment Complex in La Crosse, Wisconsin volunteered to participate in a six-week structured stretching program coined "Eldercise" by the researcher. The program was held three times a week for one hour, concentrating on the shoulder, hip, and knee joints. During the pre-test and post-test each subject was given the Rosenberg Self-Esteem Scale and measured to the nearest degree with a goniometer on the shoulder, hip, and knee joints. Six females and two males also from Carroll Heights were in the control group.

After the experimental period there was a significant ($p < 0.05$) increase in five of the eight flexibility measures utilizing Independent "T" test. The measurements that showed improvement were, knee extension, hip flexion, shoulder abduction, shoulder flexion, and external rotation of the shoulder. The Chi-Squared Transformation and Independent "T" Tests showed no significance ($p \leq 0.05$) on self-esteem. Attendance was also investigated using the Independent "T" Test. The high attendance group (17-18) improved significantly ($p < 0.05$) in shoulder flexion when compared to the low attendance group (less than 11). The average attendance group (12-16) improved significantly ($p < 0.05$) in internal rotation of the shoulder over both the high and low groups. The average attendance group also improved significantly ($p < 0.05$) in external rotation of the shoulder over the high group.

THE EFFECTS OF A SIX-WEEK STRUCTURED STRETCHING PROGRAM ON FLEXIBILITY AND SELF-ESTEEM IN ADULTS AGED 65-95

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by

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DEDICATION

I would like to dedicate this thesis to all those committed to the development of exercise programs for the elderly. May this study help those who follow to initiate and implement further research and programs for this special population.

A very special dedication goes to those twenty-three participants who made my study possible--my elderly population at Carroll Heights Apartment Complex, La Crosse, Wisconsin. They not only became my adopted grandparents, but gave me love, life, laughter and significant data this year! Thanks for all you have done for me, I'll never forget you!

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CHAPTER I

INTRODUCTION

The fastest growing age group in the United States is the elderly. While it has not been ascertained at which specific age a person should be classified as "elderly," it is common to classify "elderly" as anyone past the age of 65 years. Individuals join these ranks at the rate of approximately 1,000 per day (Jamy, 1980). It is estimated by the end of 1985, 50% of the population will be older than 50 years (Jamy, 1980). The baby boom of the past is being replaced by the senior citizen explosion. Jamy (1980) believes that this population can attain a healthful and fulfilling life span given the proper health and special care required to meet their needs.

It is a popular belief that people decline quickly both mentally and physically after age 65. While society seems to say "take it easy; your're getting older and shouldn't do as much," activity and exercise may actually help keep older adults happier and healthier (Hoffberger, 1980). Exercise will not reverse the process of aging, but through regular activity, older adults can improve their psychological and physiological condition. Aging is a complex process that begins at birth and is influenced by lifestyle, heredity, and environment (Sager, 1983).

Frankel and Richard (1980) state that many older people do not exercise because they have been conditioned to believe that "society" says they should not. Activity or the lack of it can affect their lives.

When the elderly withdraw from physical activities, they become more immobile. This leads to a decline in health and spirit and may eventually lead to institutionalization. According to Frankel and Richard (1980) it doesn't have to be this way. Simply stated, regular exercise can enhance the lives of the elderly physically, mentally, and emotionally.

With the population growing older, more research is needed to assess these physiological and psychological benefits of exercise. Through the implementation of a structured exercise program, these older Americans can be re-educated to the benefits of exercise in their age group.

Purpose of the Study

The purpose of the study was to determine the effects of a 6-week structured stretching program on self-esteem and flexibility in older adults aged 65-95 years.

Need for the Study

A scientific and social breakthrough of great significance is the recognition that many problems historically attributed to aging are really the products of neglect, abuse, and lack of fitness (Harris, Frankel, Harris, 1977). Older Americans are often stereotyped as needing nursing home care and constant supervision. However, only 7% of the elderly live in health-care centers (Egan, 1985). This study is specifically concerned about exercise programs for the other 93%. Eighty percent of the nation's 28 million elderly 65 and older are

1. There will be no significant difference in the pre-test and post-test scores in self-esteem in adults aged 65-95 after a six-week structured stretching program when comparing an experimental to control group.

2. There will be no significant difference in the pre-test and post-test scores in four or more of the eight flexibility measurements in adults aged 65-95 after a six-week structured stretching program when comparing an experimental to control group.

3. There will be no significant difference in pre-test and post-test scores in any of the eight flexibility measurements in adults aged 65-95 when related to the number of sessions attended (high attendance group; 17-18 sessions, average attendance group; 13-16 sessions, and low attendance group; 12 or fewer sessions.

Assumptions

Within this study, it was assumed that:

1. The participants gave their best effort while performing the exercises.

2. The participants were not exercising outside of the study.

3. The participants understood and performed the exercises correctly.

4. The goniometer was a valid and reliable measure of flexibility in the shoulder, hip, and knee joints.

5. The Rosenberg (1965) scale of self-esteem, adapted to an interview format, held a similar reliability and validity as the original scale using a questionnaire.

6. The self-esteem questionnaire/interview was understood and answered honestly by all the participants.

7. The structured stretching program was specifically designed for flexibility in the shoulder, hip, and knee joints.

8. The goniometer measurements and questionnaire/interview were administered consistently and without bias.

Delimitations

The following delimitations were established for the study:

1. Only ambulatory, healthy adult residents, aged 65-95, of Carroll Heights Apartment Complex were involved in the study.

2. The Self-Esteem Scale by Rosenberg (1965) were used to measure self-esteem.

3. The goniometer was used to assess range of motion of the shoulder, hip, and knee joints.

4. A structured stretching program met three times a week for a one hour session over a period of six weeks.

Limitations

The study was unable to control for:

1. The participants were volunteers and were randomly placed in experimental and control groups.

2. Physical limitations, illness, disease, stress, and prescription drugs may have altered their ability to perform the exercises.

Definition of Terms

Flexibility - the ability of the tissues surrounding a joint to yield to stretching and then to relax (Luttgens & Wells, 1982).

Goniometer - an instrument used to assess range of motion in a joint. This tool has one arm stationary and the other movable. At completion of the movement, the indicator shows the number of degrees through which the segment has been moved (Luttgens & Wells, 1982).

Elderly - an individual between the age of 65 and 95 with little or no functional impairment, and living a relatively independent life (Sager, 1983).

Range of Motion - the range measured in degrees of a circle, through which a joint can be extended and flexed (Luttgens & Wells, 1982).

Self-Esteem - an individual's self-evaluation which expresses an attitude of approval or disapproval, and indicates the extent to which the individual believes himself/herself to be capable, significant, successful, and worthy (Coopersmith, 1967).

CHAPTER II

REVIEW OF RELATED LITERATURE

Little research exists in the area of self-esteem and its relationship to exercise in the elderly population. The following discussion deals with the related literature on exercise and the elderly, as well as the physiological and psychological factors which may be associated with exercise and the elderly. These include exercise and the elderly, flexibility, and self-esteem.

Exercise and the Elderly

Sager (1984) found confusion and hesitation with respect to what exercises may be appropriate for the over 60 group. This continuous hesitation is also shared by the elderly and health care specialists alike. Some are wary of exercise for this potentially high-risk group, perhaps due to lack of accurate information. Others have a fixed image that the elderly have served their vital purpose in life, and now it is their time to rest. Recent research is now indicating that older adults benefit from an exercise prescription or an organized program of physical activity (Sager, 1984).

Sager (1984) stated that exercise classes can range from low-intensity stretching to aerobics. Many older adults are not very interested in cardiovascular fitness programs; they complain that it is just too vigorous. Many prefer a program which concentrates on increasing or maintaining flexibility (Sager, 1984).

The values of physical fitness and exercise are not limited by age. They are general and apply with varying degrees to all ages. The physical fitness needs of individuals vary with increasing age. Exercise programs have to be geared toward the needs and restrictions of each population, especially for the elderly (Sager, 1983).

Physiological Benefits of Exercise

Bortz (1980) believes that many of the changes in the body structure and function commonly attributed to aging can be retarded by an active exercise program. In 1982, Bortz reviewed the biological changes that occur during the aging process in the cardiovascular and nervous systems, in blood constituents, body composition, and metabolic functions. He concluded that at least a portion of these changes are caused by physical inactivity that can be modified by a continuing program of physical exercise.

Kasch, Phillips, and Carter (1973) completed a study on cardiovascular changes in men, ages 39 to 60. They divided these individuals into exercise and non-exercise groups and then compared the effects of two years of physical training on each group. Exercise consisted of 60 minute sessions, principally running, three times a week. The results in maximal aerobic capacity and maximal pulmonary ventilation improved significantly in the exercising group while essentially no change occurred in the non-exercising group.

Benefits of a regular exercise program in the older adult may include decreases in myocardial oxygen demand and blood pressure (Fletcher, 1984). A regular exercise program has also been found to reduce the normal aging processes of decreased muscle mass and bone loss.

Smith, Reddan, and Smith (1981) studied a group of 30 elderly women whose mean age was 84 years. They were matched for age, weight, and degree of ambulation. Eighteen served as controls and 12 participated in a light-to-moderate physical activity program three times a week for three years. The length of each exercise session was 30 minutes. The bone mineral of the exercise group showed a significant increase of 2.29%. The control group lost an average of 3.78% bone mineral.

Shephard (1978) stated that older adults reap the benefits of a well planned program of physical activity. He found an increased work capacity and lower resting and exercise heart rates, lower diastolic and systolic blood pressures, and lower oxygen requirements at sub-maximal work loads. The exclusion of older adults from physical activity denies them these benefits and can severely limit their independence and quality of life.

Bassett, McClamrock, and Schmeltzer (1982) conducted a study to determine whether a 10-week structured exercise program would benefit older adults. Three areas of flexibility, the shoulder, hip, and knee joints, were investigated. Quadricep-hamstring strength and balance were also measured. In 1982 Bassett and colleagues implemented this nonstrenuous, progressive exercise program with a self-sufficient group of elderly people. Eighteen participants completed the program, 17 women and one man. The range in age was from 62 to 88 years, with a mean age of 74. The exercise program was conducted three times a week for 30 minutes each time, for a total of 29 sessions. Participants' attendance ranged from 10 to 29 sessions, with a mean of 20. A pre-test

and post-test was administered to measure changes in flexibility, strength, and balance. A second post-test, 12 weeks after completion of the program, was also given to determine its long term effects.

The results from Bassett and colleagues (1982) showed significant improvement of flexibility in the shoulder, hip, and knee joints. Participants' strength and balance did not improve. Several factors could have accounted for this. Correlations were done to determine whether the authors' findings were associated with age, number of sessions attended, and pre-program measurements. Two significant correlations were found: balance decreased with age and the lower the pre-test measurement of flexibility, the greater the improvement.

At the National Conference on Fitness and Aging (1981), deVries stated that although there is no magical formula for eternal youth, there is good reason to believe that many people need not age as rapidly as they do. Functional losses can be a result of disuse, called "hypokinetic disease." The familiar saying "use it or lose it" applies to all people. The aging process can't be reversed, but maybe it can be slowed down.

While there are some differences in the exact nature of their physiological responses to exercise, it seems that the health benefits derived by the elderly are similar to those of middle-aged (deVries, 1981). Still, most elderly Americans participate in no significant exercise program (Sager, 1983).

Psychological Attitudes and Beliefs of Exercise

Birren, Imus, and Windle (1959) stated that aging causes impaired sensory perception and motor responses in the brain and central

nervous system. The older adult's coordination, motivation, ability, and desire to exercise decreases, and simple tasks become more difficult.

Since numerous observations linking exercise and health have been made (Belloc & Breslow, 1972; Sidney & Shephard, 1978), investigators have been interested in the attitudes of the older individual toward health and physical activity. Sidney and Shephard (1976) studied a group of health adults over the age of 65. After 14 weeks of conditioning, 85% reported improvements in their well-being and a decrease in their anxiety.

Young and Ismail (1976) studied personality differences among four groups of seven men each. Their ages ranged from 21 to 61 years. All four groups: young and fit, young and unfit, old and fit, and old and unfit, participated in a fitness program. There were three 90 minute sessions per week for four months. Several personality inventories were used to assess their personality characteristics. At the end of the program, the fit men were more self-sufficient, and all subjects in each of the four groups were more socially precise, persistent, and controlled after the fitness program.

Conrad (1977) revealed that adults in the United States have an extremely low level of physical fitness practices. He examined the beliefs that older people held about physical activity and found that many thought: (a) the need for physical activity decreases with age, (b) exercise is dangerous, (c) light sporatic exercise is beneficial to health, and (d) their own personal physical abilities were limited. Attitudes such as these may be the consequence of a prevalent societal

belief that an individual should slow down at retirement. As indicated by Conrad (1977):

> The challenge is one we cannot fail to meet. The stakes are too high. What we are talking about is, quite simply, more years of life and a more abundant way of living for 30 million of our fellow citizens (p. 1).

Even with all the positive health benefits of exercise, older adults are not exactly flocking to the local YM/YWCAs or senior centers for daily workouts (Sager, 1983). Therefore, education is necessary to dispel misconceptions about senior fitness. Greater emphasis on the psychological and emotional benefits of regular exercise need to be discussed. Sager (1983) found that through an exercise program the participants received social support, enhanced self-image, less depression, increased energy, and less craving for stimulants and tranquilizers.

Exercise Prescription and Programs for the Elderly

Performing what was once easy to do becomes a major task as a person ages (Kraus, 1978). This sometimes presents a unique problem for the person who wishes to participate in an exercise program. The exercise program or prescription needs to be tailored to the participant's ability. An important consideration is that the older adult has to considerably increase the amount of time devoted to exercise in order to get positive results (Kraus, 1978).

Kraus (1978) stated that it is important to observe certain basic rules in reconditioning the elderly. The elderly cannot tolerate excessive fatigue. Exercises should proceed gradually so that initially only mild fatigue is induced. The exercise program

should always start with relaxation and then proceed to gentle limbering exercises. Kraus recommends that after this warm-up period, gentle stretching and more vigorous stretching exercises should be done. Kraus further suggests that an exercise should never be repeated more than two or three times. Frequent changes of position are necessary. The person should always relax between movements.

Sager (1984) warns people that not all exercises are for everybody. The elderly must listen to their bodies, know their limitations, begin slowly and build gradually. She stated that they should be instructed about the exercises that stress the lower back. Most importantly they should do the exercises correctly and safely (no bouncing), find their own rhythm, not be competitive, and do the best they can.

The basic principles of exercise prescriptions are: a) intensity, i.e., how hard one exercies; (b) frequency, i.e., how often one exercises, and (c) duration, i.e., how long one exercises. All are important considerations when developing an exercise program for the elderly (deVries, 1962).

Intensity should be between 40% and 70% of an older adult's maximal heart rate (Smith & Gilligan, 1983). Maximal heart rate may be determined by subtracting the participant's age from 220. The duration of exercise should be at least 30 minutes and the frequency at least 3 times per week (Pollock, Wilmore, & Fox, 1978). The duration of an older adult's program should be longer since the intensity is low.

The purpose of a physical activity program is to provide movement. Movement is impaired in the older adult because of decreased muscle endurance, strength, and flexibility. Every complete physical activity

program should include muscle endurance, strength and flexibility components (Smith & Gilligan, 1983).

Endurance is the ability or capacity of a muscle group to perform repeated contractions (Fox & Mathews, 1981). Cardiovascular endurance activities use large muscle groups for an extended period of time which stimulates heart and lung functions.

Muscular strength as defined by Fox and Mathews (1981) is the force or tension a muscle group can exert against a resistance in one muscular contraction. To improve muscular strength, each muscle group should be stressed two to three times a week. Muscle weakness that commonly occurs in older adults is primarily observed in the quadriceps, back, abdominals, and arm muscles (Smith & Gilligan, 1983).

Flexibility is the range of motion about a joint (Fox & Mathews, 1981). Flexibility exercises should be performed for every joint. Increased flexibility enhances both specific and general body movements necessary for stooping, bending, and reaching in daily activities (Smith & Gilligan, 1983).

Programs suitable for the older adult can use a variety of activities. The choice depends on individual capabilities, interest and needs. Exercise classes for beginners who have not engaged in any regular fitness activities in years should start with chair exercises (Hoffberger, 1980). The emphasis is on bending and stretching to increase flexibility. Smith and Gilligan (1983) found that these exercises provided all the components of a good exercise program. They are rhythmic, with about one movement per second. Hoffberger (1980) stated that exercises of the lower and upper extremities may be done

separately or together. Depending on the capabilities of the participant, exercises can be performed sitting or standing.

Walking is a convenient and adaptable form of exercise. It is a rhythmic activity which places minimal stress on the heart. Walking improves musculoskeletal functions and mental outlook, and also directly benefits the cardiovascular system (Jamy, 1980).

Hoffberger (1980) found swimming to be an important exercise in her fitness program for the over sixty population. The pool functions as both a therapeutic and recreational facility. The exercises move the entire body and help to keep participants flexible. Benefits from the water exercises may simply occur because buoyancy makes the movement easier. Obstacles occurring when using swimming as a mode of exercise are: (a) fear of the water, (b) lack of confidence in ability to learn, and (c) pool accessibility.

Yoga and ballroom dancing may provide opportunities for participants to become involved in less strenuous activities. Hoffberger (1980) stated that women utilize the programs more than men by four to one. Through observation, she believed that the men in the exercise program seemed to have a poorer self-image than the women.

Several researchers have reported high attrition rates during exercise programs for the aged (Gutman, 1977). Bassett and colleagues (1982) had a retention rate of 76%, with all dropouts occurring during the first week. One reason for the low attrition was hypothesized that the program may have fulfilled some special needs. Ten of the 18 participants lived alone, whereas only 2 of the 6 dropouts lived alone. Based on their experience, Bassett and colleagues (1982)

believed that an exercise program was beneficial in most group settings for the elderly. Programs were most apt to succeed if it provided group exercise in a structured format.

Sager (1984) states that older participants prefer programs that concentrate on increasing flexibility, rather than cardiovascular fitness programs. She noted flexibility exercise programs can also be modified for participants of all ages and abilities.

Flexibility and Exercise in the Elderly

A flexible person moves easily and efficiently and has confidence in his/her movements. A person who is not flexible has more difficulty moving. One's activity level appears to be related to flexibility (Bassett, McClamorock, & Schmeltzer, 1982).

In the elderly, the simple task of daily living becomes increasingly more difficult as the activity drive diminishes (Karl, 1982). But repetitive stretching over a long period of time can permit an individual to obtain an increased range of motion that he/she needs. Bassett and colleagues (1982) showed that increases in range of motion through flexibility made it much easier for the elderly to perform everyday tasks.

Joints are one area of the body that particularly show the effects of aging. Unfortunately, joint aging may be one of the biggest hinderances for older people who are contemplating a fitness program. According to Perry (1982), the decline in joint flexibility is accompanied by decreases in stability, mobility, power, and an increase in deformity. Thus, maintenance in joint flexibility is

crucial. It may be easily developed with a program of regular stretching. According to Harkin (1981), one of the best things about flexibility development is that the positive effects from stretching become apparent after only one to two weeks.

Stretching exercises can be performed by one of two ways: (a) statically, and (b) ballistically (deVries, 1962; LeClaire, Stewart, & Walters, 1960). In 1962, deVries stated that static stretching involves stretching without "bobbing" or forcing, followed by holding the final stretched position for a given amount of time. Ballistic stretching involves "bobbing" or active movements. The final stretched position is not held. While both types of stretching will improve flexibility, the static method was preferred by deVries because: (a) there was less danger of tissue damage, (b) the energy requirement was less danger of tissue damage, (b) the energy requirement was less, and (c) there was prevention of and/or relief from muscular distress and soreness (deVries, 1961).

The benefits according to Harkin (1981) of regular stretching programs are:

1. Helps one to avoid injuries: muscle strains, overuse injuries, and knee, ankle, shoulder, and back problems.
2. Prepare one's body for an activity session.
3. Help one's muscles to relax after an exercise session.
4. Helps one to relax by forcing one to slow down and concentrate on the muscles that are being stretched.
5. Increases one's range of motion in a given joint.
6. Increases the ease with which one can move within their range of motion. These movements will be more efficient and graceful.

These are significant benefits received by a person whether they are only trying to become more flexible or desire to perform at a higher level.

Individuals exhibit various ranges of motion in the natural degree of flexibility they possess because of differences in muscle and ligament lengths. There is also a varying degree of flexibility in different joints of the body. A specific range of motion in one joint does not give an assessment of the range of motion in any other joint (Klaufs & Arnheim, 1981).

Luttgens and Wells (1982) determined that when assessing a joint's range of motion one should measure the number of degrees from the starting position of the segment to its position at the end of its maximal movement. This is the way to measure flexion. Extension is measured as the return movement from flexion.

There are various ways of measuring range of motion depending upon the joint that is measured. The instrument most commonly used according to Luttgens and Wells (1982) is the double armed goniometer. This tool has one stationary arm and a moveable one. At the completion of the movement, the indicator shows the number of degrees through which the segment has been moved. Goniometer measurements are widely accepted by physical therapists as a valid tool for joint flexibility (Bassett et al., 1982).

A review of related literature revealed that not many studies have been done on the effects of exercise on flexibility in the elderly. Lesser (1978) dealt with the effects of exercise on shoulder flexion in the older adult. In all populations this movement is

necessary to hang up clothes and reach items on a shelf, but especially the elderly as they lose their range of motion at a faster rate. She found no improvement in hip flexion and a questionable improvement in knee flexion. Both hip and knee flexion are essential in walking as well as the daily concerns of getting in and out of a chair or bath tub.

Bassett and colleagues (1982) showed significant improvement in the flexibility of the left shoulder, hip, and knee after a structured exercise program. Pre-test and post-test flexibility were measured with a goniometer. To increase the operator's reliability, a licensed physical therapist taught the researchers how to use and interpret the goniometer. Measurements were taken with the participant lying on a hard surface, measuring only the left side. One researcher took all the flexibility measurements, while the second assisted and recorded the data.

The participants' mean pre-test measurements of left shoulder, hip, and knee flexibility after a structured exercise program were: (a) shoulder, 156.8 degrees (range of 141-166); (b) hip, 95.3 degrees (range of 85-115); and (c) knee, 128 degrees (range of 113-139). Flexibility improved significantly on the post-test. The mean shoulder flexibility increased 10.5 degrees; hip, 7 degrees; and the knee, 2.4 degrees (Bassett et al., 1982).

Participants were measured 12 weeks after the program was terminated to determine whether their flexibility had declined. All three flexibility measurements decreased, however none returned to pre-exercise levels (Bassett et al., 1982).

Histological and morphological changes in cartilage, ligament, and tendon occur within the life cycle of humans. These may be a result of biological aging processes. Decreased flexibility has been reported as occurring with advancing age. But there is no evidence that biological aging processes cause this decrease in flexibility, since most research links degenerative diseases with loss of flexibility (Smith & Serfass, 1981).

More research is necessary to explore the exercise benefits in the elderly population. Current research supports a positive relationship between exercise and the elderly (Conrad, 1977). However, more research is needed to assess the extent of this positive relationship.

Self-Esteem

The relationship between the mind and body has been an area of controversy and debate for centuries. During Greek and Roman times, the unitary concepts supported a positive relationship between the mind and body (Rueggar & Vezina, 1980). In the 16th century, however, Cartesian dualism was introduced when Descartes postulated that the mind and body are both distinct and separated entities and that one does not affect the other (Hooker, 1978).

Current research proposes that a biochemical reaction is induced within the body during exercise and that this reaction elevates mood and enhances mental functioning (Rueggar & Vezina, 1980). This position, opposite of that stated by Descartes, supports the unitary conceptualization of mind and body. It presumes not only the interrelationship between mind and body, but a close relationship between human behavior and the environment (Rueggar & Venzia, 1980).

Self-esteem, as defined by Coopersmith (1967), is an individual's self-evaluation which expresses an attitude of approval or disapproval, and indicates the extent to which the individual believes himself/herself to be capable, significant, successful, and worthy. Chrzanowski (1981) describes self-esteem in a broader sense as the valid favorable image of oneself based on a fair evaluation of one's assets and liabilities. Self-esteem includes feelings of personal dignity, personal merit, and an appreciation of some of the basic human qualities which one is made of. Additionally, it is an "in touchness" with feelings of integrity, acceptability, and mastery (Coopersmith, 1967).

Coopersmith (1967) found that people with high self-esteem are generally happier, more independent, more self-confident, less anxious, and more effective in meeting environmental demands than those with low self-esteem. Persons with low self-esteem are likely to be alienated and feel incapable of controlling their lives (Robinson & Shaver, 1973).

Self-Esteem and Exercise in the Elderly

Goldberg and Fitzpatrick (1980) examined the effects of participation in a movement therapy group on morale and self-esteem in a population of institutionalized-aged persons. They concluded that low self-esteem may be a more situationally reactive phenomenon than a direct result of aging.

There is some evidence to suggest that exercise can lead to mood elevation in normal subjects and have an anti-depressant effect for those subjects who are clinically depressed (Ransford, 1982). Physical activity can provide release of pent-up tensions and internalized aggressions which if unreleased or if not properly channelled may

become self-destructive, causing depression, psychosomatic illness and insomnia (Parent & Whall, 1984).

Parent and Whall (1984) addressed a study to determine the relationship between physical activity, self-esteem, and depression in older adults. Their sample consisted of 30 people who were 60 years of age and older. Physical activity was measured by the researchers using the Functional Life Scale and a rate-made physical activity scale. The Self-Esteem Scale (Rosenberg, 1965) and the Beck (1967) Depression Inventory Scale was also used. The strongest correlation in the hypothesized direction was between physical activities that was performed on a monthly basis and self-esteem. No numerical value was given in the study for this correlation. Parent and Whall (1984) found that self-esteem and depression are negatively and strongly correlated. The support for the relationship between physical activity and improved self-esteem in the older adult is encouraging, although the exact nature of this relationship needs to be further explored.

Self-Esteem Measurement Scale

Certain basic analytical properties must be present if one is to describe self-esteem in a way that allows comparisons among descriptions (Wells & Marwell, 1977). In conventional self-esteem measurements, Wells and Marwell (1977) stated that there is a need to be standardized (comparable across respondents), objective (comparable across administrations and administrator), and quantitative (numerically expressible) in terms of the amount of self-esteem reflected.

The Self-Esteem Scale, developed by Rosenberg (1965), is unidimensional in nature. It is designed to measure attitudes

toward the self along a favorable-to-unfavorable scale (Wylie, 1974). Wylie further stated that Rosenberg is apparently the only person who has tried to achieve an unidimensional measure of global self-regard (called by him "self-esteem"). Items were drawn from the same "universe content," more specifically, from the domain of one hypothetically unified contruct.

The Rosenberg Self-Esteem Scale consists of 10 items answered on a 4 point scale from strongly agree to strongly disagree. It required about 5 to 10 minutes to complete (Robinson & Shaver, 1973). Since all items revolve around liking and/or approving of the self, Robinson and Shaver (1983) believe the scale probably measures the self-acceptance aspect of self-esteem more than it does other factors. Wells and Marwell (1977) found the concepts of self-acceptance and self-esteem to be functionally equivalent since descriptions of them are usually similar.

The Rosenberg Self-Esteem Scale was especially designed for brevity and ease of administration (Robinson & Shaver, 1973). Originally developed for use with high school students, it has since been used in a wide variety of samples (Wylie, 1977). A reproducibility coefficient of 0.92 has been obtained (Robinson & Shaver, 1977). Silber and Tipett (1955) found a test-retest reliability coefficient of 0.75 (N=28) over a two-week span. As Wylie (1974) found, it is impressive that such high reliability is attainable with only 10 items and that such a short scale has yielded relationships supporting its construct validity.

Summary

It is apparent from the present review of related literature that there is a lack of research relating flebibility and self-esteem in the elderly. The studies conducted in this area have reported that these individuals may increase flexibility following an exercise program. Other investigations show a positive relationship with self-esteem and exercise, although research with the elderly is limited.

The goniometer measuring devise utilized for flexibility, and the Rosenberg Self-Esteem Scale has been shown to be reliable and valid investigative tools. Although the Rosenberg scale hasn't been utilized much with the elderly, it does offer a beginning for the measurement of self-esteem in the elderly population. Further research is needed to investigate the relationship of flexibility and self-esteem with the elderly after an exercise program.

CHAPTER III

METHODS

This study examined changes in self-esteem and flexibility measurements of an elderly population after a six-week exercise program. The measurements were assessed prior to the implementation of a structured stretching program and immediately after its completion. This chapter includes the subject selection, procedures, instrumentation, the description of the structured stretching program, and a plan for the statistical treatment of the data.

Subject Selection

The following factors were utilized in the selection of elderly people for the experimental sample as well as the control group used for the study:

1. Male and Female
2. Age 65-95
3. Ambulatory
4. Healthy-no serious medical events in the past 6 months
5. Resident of Carroll Heights Apartments, La Crosse, Wisconsin
6. Volunteers

The initial step was to seek the support of the administration at Carroll Heights Apartment Complex. Carroll Heights was chosen by

the researcher, through the advisement of Mary Nichols, administrative assistant at the Complex, because of the physical activity needs among the residence and the probability of high compliance rate. A meeting was set with Ms. Nichols to discuss the implications of the study. After the study was approved by her, the basics of the study were discussed with the tenant council (residents of Carroll Heights, acting as representatives of all residents), to assess interest. A letter was then sent to Mary Nichols to finalize the approval of the study at Carroll Heights (Appendix A).

After a Human Subject Form was signed and approved by the University of Wisconsin-La Crosse (Appendix B), posters and fliers were put up in the Carroll Heights Apartment Complex to advertise the study (Appendix C). Next an introductory presentation of the study was made to the tenant council as well as those interested in the stretching program. The researchers discussed the specifics of the study and answered any questions that potential volunteers might have had. The orientation session consisted of an introduction to the purpose of the study, orientation to the exercises trhough the use of slides, and descriptions of testing procedures to be used. Interested persons were contacted and scheduled for pre-testing. These people were randomly assigned to an experimental or control group. Each person was given a code number to assure confidentiality. An informed consent for testing and participation (Appendix D) was obtained from each subject prior to any testing or participation in the exercise sessions.

Procedures

Pre-Testing

The study required two sessions lasting eight hours for pre-testing. This was done between 10:00 a.m. and 6:00 p.m. on Tuesday and Thursday, January 28th and 30th, 1986. Twenty-five minutes were scheduled to pre-test each of the control and experimental volunteers. At this time, self-esteem and flexibility were measured in the participant's own apartment. Questionnaires were filled out and goniometer readings were taken at the shoulder, hip, and knee joints by the researcher who was a certified athletic trainer and was trained by a registered physical therapist (Appendix E).

Post-Testing

Post-testing was performed after six consecutive weeks of regular participation in the structured stretching program. All post-testing was performed according to the procedures utilized for pre-testing. Attendance was recorded throughout the structured stretching program and utilized for post-testing information. Following completion of the post-testing, volunteers were informed of their results in flexibility and self-esteem as well as given future guidance.

Instrumentation

The measurements of self-esteem and flexibility of an elderly population before and after a six-week exercise program are discussed below.

Self-Esteem

Self-esteem of the participants in the study was determined by the Rosenberg Self-Esteem Scale (Rosenberg, 1965) (Appendix F). This scale consists of ten items answered on a four point scale consisting of: (1) Strongly Agree, (2) Agree, (3) Disagree, and (4) Strongly Disagree. The items were scored from a +2 to a -2. The scoring instructions were as follows: Items 1, 2, 4, 6, and 7 represented positive self-esteem and were scored by: (1) = +2, (2) = +1, (4) = -2. Items 3, 5, 8, 9, and 10 represented negative feelings and were scored by: (1) = -2, (2) = -1, (3) = +1, (4) = +2. To obtain the total score, the number of points received were added. Therefore, if a person had high self-esteem on all items, a top score of 20 would be obtained.

The Rosenberg Self-Esteem Scale was orginally designed as a questionnaire with .92 reliability. However, for the purpose of this study, and based on the advice of several gerontology specialists, it was administered with an interview format. This approach was adapted to ensure that the participants fully understood the directions and questions, and felt relaxed as they completed the form. The researcher placed an assigned code number on the questionnaire instead of the subject's name. This was to assure confidentiality in all of subjects.

Flexibility

The double-armed goniometer was employed to determine shoulder, hip, and knee flexibility. All measurements were taken on the left side of the subject while in a supine position. The readings were taken at the point of complete range of motion of each of the three

joints for a total of eight measurements. These measurements were: knee flexion, knee extension, hip flexion, shoulder flexion, shoulder extension, shoulder abduction, internal rotation, and external rotation. The best of the three measurements at each site was used for analysis, giving validity to the measurement tool. These measurements were recorded to the nearest degree.

Structured Stretching Program

The stretching program called "Eldercise" was scheduled for 2:00 p.m. to 3:00 p.m., Monday, Wednesday, and Friday. A 60-minute period for 3 times per week for six weeks was the time allowed for the stretching program. Warm-up and cool down periods of 10 minutes preceded and followed, each exercise session, respectively. Low intensity stretching exercises and game activities were performed during the exercise session. Attendance was taken prior to each exercise session to ascertain the compliance category as well as for motivation. These categories are as follows: high compliance, 17-18 sessions attended; average complaince, 13-16 sessions attended; and low compliance; 12 or less sessions attended. The exercises were performed at the Nutritional Side in Carroll Heights Apartment Complex, La Crosse, Wisconsin. The exact exercises performed for all three portions of the stretching program can be found in Appendix G.

Statistical Analysis

The statistical tretment of data included calculations of the means, standard deviations, and standard error of the mean on the

Rosenberg Self-Esteem Scale as well as on the eight flexibility measurements. This was done for the pre and post-test data for both the control and experimental groups. A participant's independent "t" test was performed on the sum of the differences of the ten items included in the self-esteem questionnaire and also on each of the flexibility measurements. The pre-test scores were subtracted from the post-test scores for the Self-Esteem Scale and flexibility measurements. The higher the post-test score, the greater the improvement in self-esteem and flexibility. The exception to this was that a decrease in the post-test score reflected improvement in knee extension. A Chi-squared transformation was calculated on the differences of the pre and post-test data for each of the ten item self-esteem scores for both the control and experimental subjects. A 0.05 level of significance was set for the statistical analysis of the study.

CHAPTER IV

RESULTS AND DISCUSSION

Introduction

The purpose of this study was to compare self-esteem and flexibility between adults ages 65-95 who participated in a six-week structured stretching program and those who were not involved in the stretching program. Topics discussed in this chapter were demographics of subjects, and the results of self-esteem, flexibility, and attendance. A general discussion of the results concludes the chapter.

Demographics of Subjects

The subject population consisted of twenty-six male and female volunteers who were residents of Carroll Heights Apartment Complex, La Crosse, Wisconsin. The twenty-six volunteers were randomly placed into control or experimental groups. Of the total twenty-six subjects selected, twenty-three participated in the total study. Three of the volunteers in the control group declined to be post-tested resulting in eight subjects in the control group and fifteen in the experimental group. The subjects ranged in age from 65 to 92 years (Control $\bar{X}$ = 80 years of age, Experimental $\bar{X}$ = 86 years of age). The control group consisted of six females and two males, and the experimental group contained thirteen females and two males (Table 1).

Thirteen of the fifteen experimental subjects lived alone. All of the subjects in the control group lived alone.

Table 1

Subject Data

Control Group	Experimental Group	
(N = 8)	(N = 15)	
F = 65	F = 85	F = 83
M = 74	F = 84	M = 87
F = 92	F = 87	F = 88
M = 84	F = 67	F = 85
F = 76	F = 73	F = 86
F = 75	F = 76	M = 73
F = 85	F = 78	F = 84
F = 91	F = 74	
X = 80	X = 86	

F = Female
M = Male
X = Mean age (years)

Results

Self-Esteem

The null hypothesis was stated that there would be no significant different in pre-test and post-test scores in self-esteem in adults

aged 65-95 after a six-week structured stretching program when comparing an experimental to control group.

The means, standard deviations, and standard error of the means on the pre-test and post-test data for both the control and experimental groups on flexibility are reported in Table 2. Questions 1, 2, 4, 6, and 7 represented positive self-esteem. According to the means from pre-test to post-test, the controls reported a lower self-esteem in numbers 1, 2, 4, and 7, while increases in self-esteem were noted in number 6. Out of the same five questions the experimental group produced a higher self-esteem in number 4, stayed the same in numbers 1, 2, and 7, and reported a lower self-esteem in number 6. Also in Table 2, questions, 3, 5, 8, 9, and 10 represented negative feelings of self-esteem. Reviewing the means from pre-test to post-test, the controls had a higher self-esteem in numbers 3 and 8, stayed the same in number 5, and reported lower self-esteem in numbers 9 and 10. Again out of the same five questions, the experimental group showed a higher self-esteem in numbers 3, 9, and 10, while only reporting decrease in self-esteem in numbers 5 and 8.

Using the participant's independent "t" test the sum of the differences of the 10 item Self-Esteem Scale was calculated for both the control ($N = 8$) and experimental ($N = 15$) groups. Table 3 shows that neither the pooled variance or separate variance produced significance ($p < 0.05$).

Table 2

Simple Statistic Results of the 10 Item Self-Esteem Scale

	Pre-Test			Post-Test		
Item	Mean	Standard Deviation	Standard Error	Mean	Standard Deviation	Standard Error
1a	1.50	.53	.18	1.25	.46	.16
b	1.40	.50	.13	1.40	.50	.13
2a	1.50	.53	.18	1.37	.51	.18
b	1.33	.48	.12	1.33	.81	.21
3a	.75	1.16	.41	1.25	1.03	.36
b	1.40	.50	.13	1.46	.51	.13
4a	.12	1.24	.44	-.34	1.18	.42
b	.40	1.05	.27	1.00	.92	.23
5a	1.25	1.03	.36	1.25	1.03	.36
b	.93	.88	.22	.73	1.16	.30
6a	.37	1.50	.53	1.37	.51	.18
b	1.20	.41	.10	1.06	.70	.18
7a	1.37	.51	.18	1.12	.35	.12
b	1.06	.70	.18	1.06	.70	.18
8a	.12	1.24	.44	.50	.92	.32
b	.40	1.24	.32	.13	1.30	.33
9a	-.12	1.55	.54	-.50	.92	.32
b	-.06	1.22	.31	.13	1.30	.36
10a	1.12	.99	.35	.75	1.16	.41
b	.73	1.16	.30	.93	1.00	.28

a = control group
b = experimental group

Table 3

Rosenberg Self-Esteem Scale Data and T-Test Results

Group	Mean	Standard Deviation	Standard Error	Pooled T value	Variance Estimate Degrees of Freedom	Variance Estimate 2-tail prob	Separate Variance Degrees of Freedom	Separate Variance 2-tail prob
Control (N = 8)	0.00	4.81	1.70	-0.26	21	0.796	11.40	0.815
Experimental (N = 15)	0.46	3.64	0.94					

The Chi-squared transformation was computed on an item-by-item basis to determine which of the 10 items in the Self-Esteem Scale improved significantly. The results showed that none of the 10 items analyzed independently changed significantly from the pre and post-test scores. Therefore, the null hypothesis was not rejected ($p < 0.05$).

Flexibility

The null hypothesis was stated that there would be no significant difference in pre-test and post-test scores in four or more of the eight flexibility measurements in adults aged 65-95 after a six-week structured stretching program when comparing an experimental to control group.

The means, standard deviations, and standard error of the means on the pre-test and post-test data for both the control and experimental groups on flexibility are reported in Table 4. These data showed that knee flexion improved 3.33 degrees for the experimental group while only improving 0.50 degrees for the control group. Knee extension

improved 1.26 degrees for the experimental group while it declined by 2.37 in the control group. Hip flexion improved 4.66 degrees in the experimental group and decreased 7.63 degrees on the control group. The experimental group improved 5.73 degrees in shoulder flexion, 7.67 degrees in shoulder extension, 16.47 degrees in shoulder abduction, 3.53 degrees in shoulder internal rotation and 3.67 degrees in shoulder external rotation. The control decreased 2.13 degrees in shoulder flexion, 1.50 degrees in shoulder extension, 2.50 degrees in shoulder abduction, 2.25 degrees in shoulder internal rotation and 4.00 degrees in shoulder external rotation.

Table 4

Pre-Test and Post-Test Means and Standard Deviations for Flexibility Data

		Mean			Standard Deviation		Standard Error	
Joint	Group	Pre	Post	Diff.	Pre	Post	Pre	Post
KF	C	115.62	116.12	.50	9.16	9.96	3.24	3.52
	E	117.93	121.26	3.33	12.90	12.79	3.33	3.30
KE	C	4.25	6.62	-2.37	4.97	6.63	1.76	2.34
	E	2.06	.80	1.26	4.63	2.07	1.97	.53
HF	C	107.75	100.12	-7.63	13.88	7.47	4.90	2.64
	E	102.60	107.26	4.66	7.82	7.72	2.02	1.79
SF	C	163.00	160.87	-2.13	9.94	13.19	3.51	4.66
	E	157.53	163.26	5.73	11.90	10.38	3.07	2.68
SE	C	71.75	73.25	-1.50	8.81	7.14	3.11	2.52
	E	63.46	71.13	7.67	8.06	6.27	2.08	1.62
SA	C	161.62	159.12	-2.50	15.27	20.20	5.04	7.14
	E	149.73	166.20	16.47	22.42	16.52	5.79	4.20
IR	C	77.37	75.12	-2.25	9.31	8.54	3.27	3.52
	E	75.73	79.26	3.53	17.14	13.68	4.42	3.53
ER	C	82.00	78.00	-4.00	10.69	10.67	3.78	3.77
	E	72.73	76.40	3.67	14.27	9.71	3.68	2.50

KF = Knee Flexion
KE = Knee Extension
HF = Hip Flexion
SF = Shoulder Flexion
SE = Shoulder Extension
SA = Shoulder Abduction
IR = Internal Rotation
ER = External Rotation
C = Control Group
E = Experimental Group

A participant's independent "t" test was calculated on the flexibility measurements (Table 5). The results showed significant improvements in five of the eight joints. The joints that showed significant improvement were knee extension, hip flexion, shoulder abduction, shoulder flexion, and shoulder external rotation. These findings show that of the three joint area measured (shoulder, hip, and knee) each area showed significant improvement. Therefore, the null hypothesis was rejected ($p < 0.05$).

Table 5

Flexibility Data and T-Test Results

Group	Mean	Standard Deviation	Standard Error	Pooled T Value	Variance Estimate Degrees of Freedom	Variance Estimate 2-Tail Probability	Separate T Value	Variance Estimate Degrees of Freedom	Variance Estimate 2-Tail Probability
Knee Flexion									
C	.500	7.50	2.65	-0.84	21	0.411	-0.85	14.95	0.409
E	3.33	7.81	2.01						
Knee Extension									
C	2.37	5.52	1.95	2.13	21	*0.095	1.75	8.91	0.114
E	1.26	2.76	0.71						
Hip Flexion									
C	-7.62	14.54	5.14	-2.89	21	*0.009	-2.29	8.29	*0.050
E	4.66	5.98	1.54						
Shoulder Flexion									
C	-2.12	6.35	2.24	-2.19	21	*0.040	-2.44	19.01	0.025
E	5.73	3.95	2.31						
Shoulder Extension									
C	1.50	7.54	2.66	-1.99	21	0.060	-1.93	13.26	0.076
E	7.66	6.86	1.77						
Shoulder Abduction									
C	-2.50	13.82	4.88	-3.04	21	*0.006	-3.08	15.03	0.008
E.	16.46	14.49	3.74						
Shoulder Int. Rot.									
C	-2.25	4.95	1.75	-1.42	21	0.169	-1.76	20.76	0.094
E	3.53	10.80	2.79						
Shoulder Ext. Rot.									
C	-4.00	6.78	2.39	-2.75	21	*0.012	-2.67	13.19	0.019
E	3.66	6.13	1.58						

Int. Rot. = Internal Rotation

Ext. Rot. = External Rotation

* = Significant ($p < 0.05$).

Attendance

The hypothesis stated that there would be no significant difference in pre-test and post-test scores in any of eight flexibility measurements in adults aged 65-95 when related to the number of sessions attended (high attendance group, 17-18 sessions; average attendance group, 13-16 sessions; and low attendance group, 12 or fewer sessions). The subjects were assigned to an attendance group. These groups were developed to allow five subjects in each group.

The participant's independent "t" test calculated on each of the three attendance groups showed that three of the joint movements improved significantly ($p < 0.05$) when compared to the attendance group using the pooled variance (Table 6). The high attendance group (17-18) improved significantly in shoulder flexion when compared to the low attendance group (13-16). The high attendance group improved 12 degrees in shoulder flexion after the six week structured stretching program, whereas the low attendance group decreased 1.40 degrees.

Significance was shown for internal rotation of the shoulder for the average attendance group (13-16) when compared to both the high and low attendance groups. The average attendance group improved 16 degrees while the high attendance group decreased 3 degrees and the low attendance group decreased 2.40 degrees. The average attendance group also improved significantly in external shoulder rotation by increasing 7.20 degrees while the high attendance group decreased 1.40 degrees. These findings allow for the rejection of the null hypotheses ($p < 0.05$).

Table 6

Flexibility and Attendance Group Results

Joint and Attendance Group	Mean	SD	SE	Pooled T Value	Variance Estimate degrees of freedom	2 tailed probability
Shoulder Flexion						
High	12.00	6.24	2.79	-3.72	8	* 0.006
Low	-1.40	5.07	2.27			
Internal Rotation						
Average	16.00	7.84	3.50	4.92	8	* 0.001
High	-3.00	3.60	1.61			
Internal Rotation						
Average	16.00	7.84	3.50	-4.03	8	* 0.004
Low	-2.40	6.54	2.92			
External Rotation						
Average	7.20	5.80	2.59	2.47	8	* 0.039
High	-1.40	5.17	2.31			

* Significance ($p < 0.05$)

Discussion

The results of this investigation examining self-esteem and flexibility in 65-95 year olds indicated that there were no significant changes occurring in self-esteem after a six-week study as measured by the participant's independent "t" test and the Chi-squared transformation. But as noted in Table 3, these data yielded trends. The control group was pre-tested and obtained a score of 8.0 on the Rosenberg Self-Esteem Scale. When they were post-tested they received the exact same score of 8.0 which left them with a mean of zero. However, the experimental group, when pre-tested received an 8.80, and after post-testing obtained a 9.26, resulting in a mean of .46. Thus, there was a trend toward statistical significance in improvement. This is interesting to note that the control group did not improve at all from pre-testing to post-testing, while the trend of improvement in self-esteem was seen in the experimental group. Possible explanations for not seeing any statistical significance may be due to the fact that a longer period of time is needed to see changes in self-esteem, or perhaps a larger sample size is needed.

As previously mentioned, the results achieved indicated that during a six-week exercise program, self-esteem was not statistically significant as it was assessed by the Rosenberg Self-Esteem Scale. If the Rosenberg Scale is assumed to be an appropriate instrument to assess self-esteem, then it might be concluded through this six-week study that self-esteem may change more slowly and therefore was not appropriate for measurement in a six-week study. If self-esteem is a dynamic psychological construct then over time it should change.

Psychological changes may take a longer time to occur than the six weeks allotted in this study. Chrzanowski (1981) is of the opinion that self-esteem is not a static entity, but a "qualitative experimental phenomenon that defies attempts at quantification" (p. 41). Conversely, Fitts (1982) described self-esteem not as dynamic, but as something "fixed and stable. . . the frame of reference through which the individual interacts with his world and himself/herself" (p. 2).

Based upon definitions, it would appear that these two researchers were discussing the same or very similar psychological constructs, yet one author suggests that it is dynamic and unquantifiable (Chrzanowski, 1981) while the other suggests that it is static and quantifiable (Fitts, 1972). The opinions of other researchers appear to support the dynamic quality of self-esteem (Crosby, 1982; Gergen, 1971). Perhaps a part of self-esteem is dynamic while another part remains stable. These findings may suggest that self-esteem may be different to change in such a short period of time with an elderly population, while flexibility gains can be seen much sooner.

With respect to the findings of this study related to flexibility, the results achieved utilizing the participant's independent "t" test, indicated that following a six-week structured stretching program, flexibility improved in five of the eight measures as assessed by a goniometer. Participants in the study often commented as early as the first few weeks of the study on how they noticed that their daily activities had become easier.

Individuals exhibit various ranges in the natural degree of flexibility they possess because of differences in muscle and ligament

lengths. There is also a varying degree of flexibility in different joints in the body. A specific range of motion in one joint does not give an assessment of the range of motion in any other joint (Klaufs and Arnheim, 1981). As was concluded by this study, individual joint improvements were seen in knee extension, hip flexion, shoulder abduction, shoulder flexion, and external rotation of the shoulder. Also, it is interesting to note that shoulder extension was approaching significance with a pooled variance of .06. Bassett and colleagues (1982) showed that increased in range of motion through flexibility made it much easier for the elderly to perform everyday tasks. Participants also commented that their overall energy level and confidence increased with each session. A person who is not flexible has more difficulty moving. One's activity level appears to be related to flexibility (Bassett, McClamorock, & Schmeltzer). Many subjects also found that they could relax better and sleep more soundly. As Harkin (1981) found, one of the best things about flexibility development is that the positive effects from stretching become apparent after only two weeks. Additionally, Sage (1983) found that through an exercise program the participants received social support, enhanced self-image, had less depression, increased energy, and less craving for stimulants and tranquilizers.

In the elderly, the simple task of daily living becomes increasingly more difficult as the activity drive diminishes (Karl, 1982). But repetitive stretching over a long period of time can permit an individual to obtain an increased range of motion that he/she needs. Bassett and colleagues (1982) showed that increases

in range of motion through flexibility made it much easier for the elderly to perform everyday tasks. Thus, maintenance of joint flexibility is crucial.

This study suggests that compliance is extremely important to elicit changes in flexibility. Specifically, the high attendance group significantly improved over the low attendance group since they attended more sessions and were more actively involved in the stretching exercises. The average group improved more significantly than the low attendance group. This may be due to the fact that the number of sessions attended by the average group was 13-16 compared to 12 or fewer for the lower attendance group. These results indicate that the average attendance group actively participated in more sessions leading to greater increases in flexibility.

The average attendance group improved significantly over the high attendance group in external rotation. This may be done to the fact that the majority of the average group attended 16 sessions. This number is closer to the high attendance than the low group. This occurrence may be further explained by the fact that the average attendance group began 8 degrees lower in their initial measures of external rotation. The pre-test external rotation value for the average group was 75.2 degrees and for the high group it was 83.2 degrees. The findings of this study are supported by the literature which state that greater flexibility improvements will be shown if the initial flexibility measurements are lower (Lesser, 1978).

The high complaince rate evident in this study is not unique. Guttman (1977) and Bassett and colleagues (1982) also showed high

retention rates during their elderly exercise programs. This may be due to the fact that the exercise program fulfill some special needs for the elderly participants (Bassett et al., 1982). Bassett and colleagues (1982) stated that 10 of the 18 subjects in their study lived alone and therefore the exercise program provided a form of socialization for the subjects. This was also apparent in this study since 13 of the 15 subjects lived alone. Given this information, it is possible that programs are more apt to succeed if they provide group exercise in a structured format (Bassett et al., 1982).

Flexibility may be easily developed with a program of regular stretching such as the "Eldercise" program developed by the researcher. This program not only focused on total body flexibility but utilized music, surgical tubing, fleece balls, bean bags, parachutes, and ball game activities to help keep interest high among participants. Predominate significance was seen in this study with the shoulder (flexion, abduction, external rotation) joint which may be due to the fact that the majority of the exercise program concentrated on this area. Knee extension also improved dramatically and can be attributed not only to the structured stretching program but also to the game activities utilized in cooling down (kicking the ball). It is interesting, therefore, to note that all three areas (shoulder, hip, and knee) investigated did improve, thus signifying a diverse flexibility exercise program.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

This study was conducted to determine the effects of a structured stretching program on flexibility and self-esteem in older adults aged 65-95. Eight flexibility measures and self-esteem were chosen to be examined so that an effective exercise program for the elderly could be established.

Thirteen females and two males from the Carroll Heights Apartment Complex in La Crosse, Wisconsin volunteered to participate in a six-week structured stretching program, coined "Eldercise" by the researcher. The program was held three times a week for a one hour concentration on the shoulder, hip and knee flexibility. Attendance was taken prior to each exercise session, with 17-18 sessions of attendance comprising a high group; 13-16 sessions, an average group; and 12 or less sessions, a low group. Five subjects were in the high, average, and low groups, respectively. During the pre-test and the post-test each subject was given the Rosenberg Self-Esteem Scale and measured to the nearest degree with a goniometer on the shoulder, hip, and knee joints. Six females and two males, also, from Carroll Heights were in the control group which did not participate in the structured stretching program but were pre and post-tested.

After participating in the exercise program, the subjects showed a significant ($p < 0.05$) increase in five of the eight flexibility measures. The measures reporting significant increases were knee extension, hip flexion, shoulder abduction, shoulder flexion, and external rotation of the shoulder. The high attendance group improved significantly in shoulder flexion when compared to the low attendance group. The average attendance group improved significantly in internal rotation of the shoulder over both the high and low attendance groups. The average attendance group also improved in external rotation of the shoulder over the high attendance group.

These data suggest that a six-week structured stretching program can improve flexibility in the elderly. There was no statistically significant change in self-esteem. This study further denotes that flexibility gains are obtained through regular attendance.

Conclusions

From the study performed, the following conclusions were formulated:

1. There was a significant different in flexibility in five of the eight sites measured between 65-95 year olds who participated in the six-week structured stretching program and those who did not.

2. No significance was found in self-esteem between those who participated and those who did not.

3. The significant improvements in flexibility were related to the number of session attended. The high and the average attendance groups showed significant improvement in three of the eight flexibility measurements over the low attendance group.

Recommendations

Based upon the findings of this study, the following recommendations are suggested:

1. A longer time span for the study in hopes of showing significance in self-esteem over time.

2. A psychological questionnaire that is more discriminative in producing self-esteem scores.

3. Perform a pilot study on the Rosenberg Self-Esteem Scale to determine it's reliability with the elderly population.

4. Reproducing this study but incorporate it in a nursing home population.

5. Compare the results with different programs in various high rise apartment complexes utilizing the same approximate age ranges of the present study.

6. Incorporate weights to see if any signifant difference exists between those exercising with and without weights utilizing a structured stretching program.

7. Develop a more aerobic type program for those elderly participants who are at a higher level of functioning.

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APPENDIX A

Rec'd 1-10

Mitchell Hall
University of Wisconsin-La Crosse
La Crosse, Wisconsin 54601

La Crosse Exercise Program

January 7, 1986

Mary Nichols - Carroll Heights Manager has approved the implementation of a thesis project to be conducted by Cindy Herrbold and Mary Huber, master's degree candidates in the Adult Fitness/Cardiac Rehabilitation Program at the University of Wisconsin, La Crosse. The study will involve a structured stretching program with the elderly residents at Carroll Heights Apartment Complex with three pre-test situations designed to measure body image, self-esteem, and shoulder, hip, and knee flexibility. These tests will be followed by a 6 week structured stretching program to be held in the Nutrition Site at Carroll Heights. This program will begin February 3 to March ~~14, 1986, and will meet on~~ consecutive Monday, Wednesday, and Friday mornings at 11:00am for 60 minutes. This program will be followed by a post-test evaluation of the three variables mentioned above. All information which is obtained concerning the tests will be treated as privaledged and confidential.

Signed: Mary G. Nichols Date: Jan. 13, 1986

APPENDIX B

Application for Review of Research Proposals
Involving the Use of Human Subjects

University of Wisconsin - La Crosse
La Crosse, Wisconsin 54601

Date: 1-15-86

Title of Proposed Project: Six Week Structured Stretching Program effect on Self-Esteem and Flexibility in Older Adults ages 65-85

Principal Investigator/Project Director: Mary S. Huber

(Check #1 or #2 below - whichever is appropriate)

1. [X] This application was reviewed by a departmental committee consisting of the undersigned. The committee finds that the proposal does not encompass investigations involving human subjects who may be placed at risk, including clinical research. (If the decision by the Departmental Review Committee is not unanimous, the proposed investigation must be reviewed by the Institutional Review Board on the Use of Human Subjects.

Dr. Philip J. Buckenmeyer
Principal Investigator
(Faculty Member)

Committee Member

Keith French
Department Chairperson

2. [ ] This application includes or is likely to include investigations involving human subjects who may be placed at risk, including clinical research. It is hereby certified that the procedures encompassed by this application should be reviewed by the Institutional Review Board (Use of Human Subjects) in accordance with Public Law 93-348.

Principal Investigator
(Faculty member)

Committee Member

Department Chairperson

NOTES:

"'Subject at risk' means any individual who may be exposed to the possibility of injury, including physical, psychological, or social injury, as a consequence of participation as a subject in any research, development, or related activity which departs from the application of those established and accepted methods necessary to meet his needs, or which increases the ordinary risks of daily life, including the recognized risks inherent in a chosen occupation or field of service."

Signed copies of Attachment A should be distributed to the Principal Investigator, Department Chairperson, Dean of the School/College, and the Institutional Review Board Chairperson.

APPENDIX C

"E L D E R C I S E"

(Stretching Program Specifics)

WHAT CAN THE PROGRAM DO FOR YOU:

* Enchanced movement of the body
- Ease in carrying out daily activities
- Decrease stiffness in joints
- Increased sense of well being and ivigoration
- Socialization and FUN!

WHERE:

- Carroll Heights Nutrition Site

WHEN:

- Every Monday, Wednesday, and Friday
- February 3 through March 14, 1986

TIME:

- 2:00 P.M. to 3:00 P.M.

COST:

- FREE!

WHO:

- Cindy Herrbold and Mary Huber - Exercise Specialists, University of Wisconsin-La Crosse

FOR MORE INFORMATION, FEEL FREE TO CONTACT:

- Cindy Herrbold 785-7046
- Mary Huber 784-5596

OR, ATTEND AN INFORMATIONAL MEETING OF THE TENANT COUNCIL AT THE NUTRITION SITE, TUESDAY, JANUARY 21, 1986 AT 2:00 P.M.!

HOPE TO SEE YOU THERE!

APPENDIX D

CONSENT FORM

I, _____ understand that I have volunteered to participate in a graduate study involving the measurement of shoulder, hip, and knee flexibility and self-esteem. I will be asked to participate in a structured stretching program called "ELDERCISE" held on Monday, Wednesday, and Friday at 2:00 p.m. at the Nutritional Site in the Carroll Heights Apartment Complex. I will also be asked to sign up for two meeting times to be held in my apartment.

During the first appointment I will be asked to complete a pre-test self-esteem assessment scale. The individual result of this scale will remain completely anonymous. I will then participate in a test to measure flexibility of the shoulder, hip, and knee using a goniometer.

At the completion of the stretching program I understand that I will again complete the post-test procedures as stated above. I further understand that the information which is obtained concerning the test will be treated as privileged and confidential and will not be revealed to any non-affiliated person without my consent.

To my knowledge, there are no physical reasons why I can not participate in the tests or program mentioned above. Any questions I may have regarding procedures may be directed to the reasearcher periodically throughout the study. I understand that I may withdraw from the study at any time.

Signed _____ Date _____

Witness _____

APPENDIX E

GONIOMETER ASSESSMENT FORM
PRE AND POST-TESTING

Participant's Number _____

		POST-TEST	PRE-TEST
		KNEE	
Flexion:	trial 1	_____	_____
	trial 2	_____	_____
	trial 3	_____	_____
	final value	_____	_____
Extension:	trial 1	_____	_____
	trial 2	_____	_____
	trial 3	_____	_____
	final value	_____	_____
		HIP	
Flexion: (0-130)	trial 1	_____	_____
	trial 2	_____	_____
	trial 3	_____	_____
	final value	_____	_____
Extension: (0-45)	trial 1	_____	_____
	trial 2	_____	_____
	trial 3	_____	_____
	final value	_____	_____
		SHOULDER	
Flexion: (0-180)	trial 1	_____	_____
	trial 2	_____	_____
	trial 3	_____	_____
	final value	_____	_____

Extension: (0-60)	trial 1	_____	trial 1	_____
	trial 2	_____	trial 2	_____
	trial 3	_____	trial 3	_____
	final value	_____	final value	_____
Abduction: (0-170)	trial 1	_____	trial 1	_____
	trial 2	_____	trial 2	_____
	trial 3	_____	trial 3	_____
	final value	_____	final value	_____
Internal Rotation: (0-80)	trial 1	_____	trial 1	_____
	trial 2	_____	trial 2	_____
	trial 3	_____	trial 3	_____
	final value	_____	final value	_____
External Rotation: (0-90)	trial 1	_____	trial 1	_____
	trial 2	_____	trial 2	_____
	trial 3	_____	trial 3	_____
	final value	_____	final value	_____

APPENDIX F

SELF-ESTEEM SCALE

Participant's Number _____

---

1. Strongly Agree 2. Agree 3. Disagree 4. Strongly Disagree

---

1. I feel that I'm a person of worth, at least on an equal basis with others.

2. I feel that I have a number of good qualities.

3. All in all, I am inclined to feel that I am a failure.

4. I am able to do things as well as most other people.

5. I feel I do not have much to be proud of.

6. I take a positive attitude toward myself.

7. On the whole, I am satisfied with myself.

8. I wish I could have more respect for myself.

9. I certainly feel useless at times.

10. At times I think I am no good at all.

SCORING

Items were scored from a +2 to a -2. The scoring instructions were as follows:

Items 1, 2, 4, 6, 7 represented positive self-esteem and were scored by: (1) = +2, (2) = +1, (3) = -1, (4) = -2.

Items 3, 5, 8, 9, 10 represented negative feelings and were scored by: (1) = -2, (2) = -1, (3) = +1, (4) = +2.

To obtain the total score, add the number of points received. Therefore, if a person had a high self-esteem on all items, a top score of 20 would be obtained.

APPENDIX G

ELDERCISE

The following exercises are in a progression and are designed to improve to total body flexibility. The exercises are to be performed in a seated position in a comfortable chair complete with a back rest. The feet should be spread comfortably apart and kept flat on the floor unless the participants are instructed to do differently. I may also be of benefit to have the participants grasp the sides of the chair for greater stability. As the program progressed, more repetitions of each exercise were performed to ensure that the participants were challenged.

Facial Exercises

These exercises are designed to improve the muscular tone of the facial region.

Eye Opener - Sitting erect, open eyes widely, close tightly and repeat.

Eye Scan - Sitting erect, head stationary, look right, left, toward ceiling, toward floor.

Chewy - Sitting erect, head up, open mouth, begin chewing make exaggerated bites.

Vowel Sounds - Verbalize the vowel sounds, accentuating each letter (A, E, I, O, U).

Popeye - Turn lips all the way to the right side of the face, hold it, return to the center, repeat to the left side.

Smiles/Frowns - Accentuate smiling and frowning movements.

Neck Exercises

These exercises are designed to improve the function and range of motion of the muscles and joints of the neck.

Neck Rolls - Slowly roll and drop the head forward, around to the side, backward, to the opposite side, moving as far as possible in each direction. Reverse direction.

Ear Toward Shoulder - Sitting back in chair, move head alternately, right ear toward right shoulder, then left ear toward left shoulder, keeping shoulders perfectly still. Repeat.

Chin to Chest - Slowly tilt head back and open and close the mouth. Slowly drop chin toward chest.

Look Left, Look Right - Sitting erect, turn head first to look over right shoulder, then to look over left shoulder.

Shoulder Exercises

These exercises enhance and improve the range of motion in the shoulder girdle.

Shoulder Shrugs - Sit back in chair with hands on thighs. Shrug shoulders up toward ears and down.

Shoulder Rotations - Sitting erect, shrug the shoulders and slowly rotate them forward, making complete rotations. Then rotate shoulders backward.

Arm Circles - Sitting back in chair, extend arms horizontally at shoulder level, palms down. Stretch arms outward without bending elbows, holding head up. Rotate arms slowly from the shoulders making very small circles. This is to be performed forward and backward.

Reach for the Sky - Sit erect, stretch arms straight above head, relax and repeat.

Apple Picker - Sitting back in chair, holding stomach in, lift neck high and looking at the ceiling, raise both hands above head as if ready to

pick apples. Alternately and rhythmically raising and lowering the arms.

Cheerleader- Extend left arm outward to the side, bend right elbow neck, alternately flex and extend the arms in one smooth motion.

Straight-Arm Fists - Extend arms in front of body, parallel to the floor. Make fists, extend fingers, wiggle fingers.

Punches - Alternately thrust one arm forward with fist clenched at shoulder level four times and thrust upward toward ceiling four times. Repeat four counts for each arm punching in each direction.

Criss-Cross - Begin with arms extended and crossed in front of thighs, feet slightly apart. Raise arms above head and, keeping them crossed, make a circle, moving in a clockwise direction. Then uncross arms and bring them down to sides in a continuous movement, again crossing them in front of thighs.

Hugger - Place arms around the body in a hugging position, squeeze tight, alternate top arm. Repeat.

Arm Flings - Sitting erect and extending arms forward at shoulder height, crossing at the wrists, right arm over left. Keeping elbows straight, fling arms outward and backward as far as possible, never letting them drop below shoulder level. Then repeat, crossing left arm over right.

Alternate Arm Swings - With arms straight and down at the side, alternately swing them back and forth as high as possible.

Swimming Drills - Perform the front crawl stroke action with the arms alternately extending and flexing in front of the body. Complete the same motion as mentioned above, but perform the back stroke motion.

Peck Poppers - Sitting erect, elbow out to each side and flexed at shoulder height, fists toward the ceiling. Slowly push elbows backward as far as possible and then bring the elbows and forearms together in front of the body.

Wing It - Bend elbows, place fist near arm pit and raise elbows upward and downward like a chicken.

Back Pack - Bring the right arm over the right shoulder to "pat the back". Bring the left arm over the head and grab the right elbow and gently pull the right elbow downward. Repeat with the other arm.

Hand Exercises

These exercises will improve finger and hand dexterity.

Open and Shut - Place arms in front of body, extend fingers as wide as possible, hold, make a fist, clench tightly, release and repeat.

Wrist Wavers - Place arms in front of body, rotate wrist upward, downward, ulnar deviate, radial deviate. Repeat with hands parallel.

Leader of the Pack - Place arms in front of body, make a fist, rotate fist forward and backward.

Finger Stretches - Interlace fingers, rotate outward away from the body, return and repeat.

Trunk Exercises

These exercises will improve the range of motion of the muscles and joints of the trunk region.

Side Bender - Sitting erect with hands on hip, extend arm over head, keeping right hand on hip, bend to right side as far as possible. Repeat with opposite side.

Pick-Ups - Sitting erect, arms hanging at side, alternately bend to the right side pretending to pick up an object off of the floor, returning to starting position. Repeat.

Twisters - Sitting erect, arms straight out to the side, as if you want to see what is behind you. Then turn to the other side. Keep your pelvis straight while you twist your trunk.

Elbow Drops - Lace fingers behing the head, twist the trunk to allow right elbow to move toward left knee, return to starting position. Alternate left elbow to the right knee.

Alternate Toe Touches - Sitting erect, bend at the waist with the left arm extended behind the body, attempt to touch left foot with right hand. Return to starting position and repeat with left hand touching right foot.

Front Stretch - Extend straight arms in front of the body, slowly stretch forward and attempt to touch floor between feet. Return to starting position and then raise arms above head. Repeat.

Inverted Sit-Up - Sitting erect, lace fingers behind head, bend at the waist and attempt to touch elbows to knees, return to starting position. Variation: alternate elbows to opposite knee.

Hip Exercises

These exercises are designed to improve range of motion in the muscles and joints of the hip.

Marching - Alternately raise and lower right and left feet as if marching in place (slow/fast).

Knee to Chest - Grasp leg below knee and pull leg toward chest while opposite leg remains on the floor. Attempt to touch head to knee. Repeat using opposite leg.

Leg Lifts - Extend right leg out in front of body, lift leg off chair as high as possible. Return to starting position. Repeat with opposite leg.

Hip Hiker - Holding the sides of the chair, alternately raise and lower one hip from the chair without moving the head. Repeat with opposite side.

Foot Raises - Holding the sides of the chair, with knees comfortably apart, with the knees bent. Slightly raise both feet off the floor.

Arch Touches - Raise right leg up as if to cross over left knee. Touch inside of right foot with hand. Return to starting position and repeat with opposite side.

Knee Exercises

These exercises will improve the range of motion in the knee muscles and joints.

Toesies - Feet should remain flat on the floor, shoulder width apart. Extend the right foot outward touching the toe to the floor. Next, move foot backward under chair, as far as possible, touch the toe. The left foot should remain stationary. Return to starting position. Repeat with left foot while the right foot remains stationary. (Variation: repeat simultaneously).

Knee Extensions - Lace fingers under the right thigh while extending right leg and returning back to starting position. Repeat with the opposite leg.

Knee Rotations - Lace fingers under right thigh, rotate knee clockwise, then counterclockwise.

Side Swings - Place knees together, slide the feet alternately right, then left. (Variation: raise the feet alternately right/left).

Quad Stretches - Grasp the left side of the chair with the left hand, slide the body toward the right side of the chair. Flex the right leg and grab right ankle or pant leg with the right hand. Hold, return to starting position. Repeat on the left side.

Straddle Swings - Straddle the chair with legs. Grasp the front of the chair with both hands. Extend right leg forward pointing toe and then tlex leg back, touch the toe to the floor. The left leg remains stationary. Return to starting position and repeat with the opposite leg.

Feet and Ankle Exercise

These exercises are designed to improve the range of motion in the muscles and joints of the feet and ankles.

Foot and Ankle Rotations - Keeping the leg straight and still, rotate each foot separately, then reverse. Repeat with the opposite foot.

Toe Pointers - Extend foot outward, point toe, hold, point heel, hold. Repeat.

Heel, Toe, Heel - Place the heels together forming a "V". Move heels out, then toes out, then heels out. Reverse and repeat.

Toe Tappers - Place the feet flat on the floor. Tap the right toes and then the left. Tap both toes together.

Game Activities

These activities were designed to be incorporated into the cool down portion of the program. They may also be beneficial to promote socialization, relaxation, and compliance.

Plastic Ball Activities

Partner and Individual

#Kicking - right foot only, left foot only

#Bounce Pass

#Tossing

#Catching

Fleece Ball/Bean Bag Activities

Partner

#Tossing

#Catching

Individual

#Accuracy Throw

Parachute Activities

Group

#Stretching

#Making Waves

#Inflate Parachute

#Waves with balls

Surgical Tubing Activities

Individual

#Stretching

#Leg Raises

#Low Resistive Activities

Group

#Tug of War

Partner Back Massage