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A Comparison Of Active And Inactive Senior Citizens On Selected Tests Of Balance, Strength, And Flexibility

Nancy J. Daum
Eastern Illinois University

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A COMPARISON OF ACTIVE AND INACTIVE SENIOR CITIZENS ON SELECTED TESTS OF BALANCE, STRENGTH, AND FLEXIBILITY

(TITLE)

BY

Nancy J. Daum

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

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IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
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5-13-83 DATE	W L Lowell DEPARTMENT CHAIRPERSON

A COMPARISON OF ACTIVE AND INACTIVE SENIOR CITIZENS ON SELECTED TESTS OF BALANCE, STRENGTH, AND FLEXIBILITY

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Nancy J. Daum

An abstract

submitted in partial fulfillment

of the requirements for the degree of

Master of Arts in Gerontology

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May, 1983

A COMPARISON OF ACTIVE AND INACTIVE SENIOR CITIZENS ON SELECTED TESTS OF BALANCE, STRENGTH, AND FLEXIBILITY

This study was conducted to determine if there was a difference between active and inactive senior citizens on selected tests of strength, balance, and flexibility. Participation in physical activity should be encouraged so the senior citizens will be more physically fit, be more independent, and lead more active and satisfying lives.

Twenty-five female volunteers of varied backgrounds from the Charleston and Mattoon Senior Citizen Centers served as subjects for this study. The age range was 62 to 93 years of age and the average age was 75 years.

The subjects were given instructions for the strength, balance, and flexibility tests before and during each test. A modification of the Smedley Dynamometer was used to measure the strength of each subject's dominant hand. Each subject was tested in a standing position with the dynamometer held free from the body. The mean of the three trials was the score used.

The test for balance was given on an electronic stability platform and was set at 10 degrees. The subjects were considered to be out of balance if the platform was tipped to 10 degrees or beyond and was considered in-balance up to 10 degrees. Three 1/100 second stop clocks recorded the amount of time in-balance and out of balance. The time to the nearest hundreth of a second was recorded for each position-left, center, and right. The score was a percentage of time the subjects remained in-balance.

The final test given was for trunk flexibility and the instrument

used was an L-shaped testing box. The subjects performed leg stretching exercises prior to this test and removed their shoes to allow for conformity in the testing. The subjects were allowed four practice trials, sliding the indicator on the test instrument as far as possible, followed by three trials which were recorded to the nearest quarter of an inch. The subjects' scores were the best score from the final three trials.

The findings indicated a tendency for the active group to score better on each of the three tests but the mean difference between the two groups was not significant. Therefore, the null hypothesis was accepted in this study. There is no difference between active senior citizens and inactive senior citizens when comparing their strength, balance, and flexibility.

ACKNOWLEDGMENTS

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CHAPTER I

INTRODUCTION

Improving and maintaining the quality of life and the physical well-being of senior citizens is a high priority because of the increase in life expectancy and in the number of older people. Whiddon and Gilkison (13) suggested to sustain a high quality of life, a person needs to engage in a physically active life. Remaining active permits continuation of many daily routines people perform, such as cleaning house and walking. These activities depend on various skills like ability to balance the body, muscular strength to lift objects, and joint flexibility to bend. Physical activity utilizes the muscles, joints, and skills necessary to perform these daily tasks. Research on the use of muscles and the body during various skills has been enormous. However, little research has been conducted in the areas of balance, strength, and flexibility in senior citizens; therefore, this study focused on these three parameters.

Statement of the Problem

The purpose of the study was to compare the differences in strength, balance, and flexibility among the more active and the less active senior citizens.

Null Hypothesis

For the purpose of this study the following null hypothesis

was tested: There is no difference between active senior citizens and inactive senior citizens when comparing their balance, strength, and flexibility.

Need for the Study

Active and inactive senior citizens have at least one problem in common, the problem of physical aging, which is a slow degenerative process of the body. Although an exercise program for senior citizens may not stop this process, Corbin (4) indicated there is evidence that exercise may delay the aging processes. Exercise may be important in life, especially in the later years, to keep the body functioning correctly. Improved physical capacity is generally thought to help elderly people lead a more enjoyable life. Since the life expectancy is increasing, as well as the number of senior citizens, methods should be explored to improve the quality of the later years of life.

The inclusion of physical activity in a person's lifestyle may permit the older person to continue living normally, without a high degree of degenerative processes. Physical activity is important in this modern, fast-paced society if the older person wants to maintain or increase a status in society. Remaining active, mobile, and independent of others is necessary as well since younger people do not want to be burdened by older people. Society pressures older people to lead an inactive life, accounting for many of the physical problems the older people face. Senior citizens should assume a more active lifestyle rather than the inactive. Younger people are astonished when they see senior citizens participating in activities and some younger people feel the elderly are too old to be involved in either light or strenuous activities. Participation should be encouraged

so senior citizens will be more physically fit. Since they will be able to attend to their own needs they will be more independent of the younger population.

Senior citizens require flexibility of their body to lead an active, satisfying, and autonomous life. Physical activity may aid in achieving these goals and this study was conducted to determine whether having a physically active life leads to better balance, strength, and flexibility.

Limitations

Several limitations were encountered during this study. The number of subjects involved was relatively small and may not have been representative of the population. The research was confined to the residents of Coles County, a relatively rural area. Another limiting factor was the procedures used for determining active and inactive senior citizens. The groups were formed on the reported activity level of each participant. A final limitation was the problem of measuring the precise amount of time that each subject was tested on the stabilometer. Since there were small variations in the total time, the percentage of time in-balance was used for scoring instead of the actual time.

Definition of Terms

The following terms are defined as they were used in this study:

Balance

Balance is "the relationship of the body to gravity," according to Drowatzky (6).

Flexibility

de Vries (7) stated that "flexibility is the range of movement of a joint or a series of joints."

Hand Dynamometer

A hand dynamometer is an instrument used to measure hand grip strength.

Stabilometer

A stabilometer is an instrument used to measure static balance.

Strength

Singer (12) reported that "strength is the capacity of a muscle or a group of muscles to exert maximum pressure against a given resistance in a limited period of time."

CHAPTER II

REVIEW OF RELATED LITERATURE

The study of physical fitness and the elderly is a relatively new field and the research reported was specific to selected areas. Most of the related literature concerning the physical activity of senior citizens has been on flexibility and strength. Little research has been conducted on balance in relation to the elderly. Many studies have pertained to physical fitness and the elderly in general. de Vries (8) made a broad statement about fitness and the elderly. He explained that ten years may be added to the life expectancy of a person if a regular physical fitness program was begun early in life. Also, the quality of the later years of life would improve if a regular fitness program was implemented. Whiddon and Gilkison (13) stated that many of the physical problems the elderly face, such as fatigue, inflexibility in joints, and lack of coordination, may be reduced through physical activity, thus improving the later years of life.

The trainability of the older person through a fitness program has been the topic of many research studies. A general conclusion of the studies has been that an older person can improve himself through exercise and physical conditioning as well as a young person, according to Mravetz (10). The theory that senior citizens may be trained in physical fitness should be adequate justification to encourage the involvement in physical activity.

In addition, de Vries (8) commented that at the present time, available evidence suggests a suitable vigorous physical fitness program would be the intelligent choice of lifestyle. Mravetz (10) reinforced this position by stating the effects of exercise on the aging process

in middle-aged and older people are opposite of those commonly associated with the aging process. A theory that individuals can control their aging process, to some extent, and prevent premature aging through physical exercise has been expressed by Whiddon and Gilkison (13). Research studies have given support to this theory. de Vries (8) explained that Czechoslovakian physiologists reported better physical performance and functional capacities in a sample of physically active older men than in a comparable sample of sedentary older men. This study supported the more active lifestyle for better health than a less active lifestyle. Other studies such as the "bed rest" study by Mravetz (10) was performed to determine if losses were related to the decreased activity level of the individual or to aging itself. She concluded that "bed rest" produced negative physiological changes in a matter of weeks in young, well-conditioned individuals. This study suggested that the physiological changes may be more related to decreased activity such as "bed rest" or inactivity in old age, rather than to aging itself.

Flexibility

de Vries (8) indicated that physical exercise can help preserve flexibility. He stated there was considerable evidence that maintenance of good joint mobility prevented, or to a large degree, relieved the aches and pains that became more common with increasing age. Good joint mobility helped to attain an increased level of self-sufficiency in performing daily tasks, such as dressing and reaching for zippers and buttons or bending to pick up something. A determining factor of how much flexibility a person has is the amount of activity in which the person participates, Beaulieu (1) explained. Flexibility does

decrease with age, but the more active individuals do not show as rapid a decrease.

Frekany and Leslie (9) stated the existing level of flexibility of sedentary senior citizens can improve with a well-rounded exercise program, while a reduction in activity usually accounts for a loss in flexibility. Muscles do not stretch as much when activity is reduced and they begin to shorten from natural muscle contraction. Beaulieu (1) suggested the physiological changes, which shorten the muscle, can be kept at a minimum through increased activity and muscle stretching. Physical exercise is not only important for flexibility, it is necessary for strength.

Strength

Exercise is necessary to maintain the strength and function of the musculoskeletal system, advised de Vries (8). An important factor in maintaining or increasing the strength level to be able to continue personal daily routines is exercise. The progressive reduction of muscular strength after age thirty is so uniform that it can be represented by a straight line, Bertolini (3) commented. Behnke et al (2) reported a loss of muscular strength and endurance and concluded that the loss was accelerated in the sixth and seventh decades of life. The degree of loss or disability is not accelerated the same when exercise is performed as when exercise is not performed. Exercise affects the way a person's body will function. Corbin (4) stated there is a direct link between muscular activity, circulation, and the aging process. More activity will allow a person better circulation and a better process of aging. The process of aging occurs at different levels. Important age changes occur at the cellular level, according

to de Vries (7). He sugested there is a loss of contractile elements which accounts for the loss in strength. The loss of strength in the elderly has been researched, particularly in older athletes.

A few studies were reported concerning the muscular strength of older athletes. A Danish report examined the right-hand grip force of physical education teachers and the test was repeated 25 years later. No information was given on the activity habits of the teachers, although they were presumably more active than the general population. Losses of strength in both the men and women physical education teachers were reported, and the losses were at least as large, if not larger, in sedentary groups, Behnke et al (2) concluded.

Another society was a sample for a strength test. Behnke et al (2) studied the muscular strength of Eskimos between 25 and 55 years of age. They reported the hand grip force declined from 54 to 39 kilograms for males. The strength of the hand grip for Eskimo women remained relatively constant and only decreased from 30 to 27 kilograms. The limited availability of furniture and domestic equipment and the tradition of carrying small children on the back may have been factors which helped preserve their strength.

Balance

Factors preserving balance have not been researched as completely as for strength or flexibility. Roberton and Halverson (11) referred to a study conducted by Heikkinen. This study researched the effect of a training experience on the improvement of balance in 69-year olds and significant improvement was reported from this study. Munns also reported improvement of balance. Munns conducted an exercise and dance program for 20 elderly women with the average age of 72 years. The

results indicated the exercise and dance group did improve balance while the control group did not, explained Roberton and Halverson (11). One reason for lack of balance and coordination was given by Davis (5). He reported impaired perception of position and relationship in and to space as one reason.

Since more research on these specific abilities was needed, this study was conducted to determine whether senior citizens who were more active maintained better balance, strength, and flexibility. The literature supported the theory that activity may decrease the disabilities or losses in these specific abilities.

CHAPTER III

METHODOLOGY

This study was designed to compare the differences in strength, balance, and flexibility among the more active senior citizens and the less active senior citizens. The subjects for this study were women participants of varied backgrounds at the Charleston Senior Citizens Center and the Mattoon Senior Citizens Center.

Subjects

Twenty-five female volunteers residing in the Coles County area in Illinois were the subjects for this study. The age range was 62 to 93 years of age and the average age was 75 years. The subjects were a small sample of the women who visited the two Senior Citizens Centers on the particular days the study was conducted.

Questionnaire

A questionnaire was completed by the subjects prior to taking the tests. A sample of the questionnaire appears in Appendix A. Information concerning the extent of their physical activity was requested on the form to determine the physical status of the participants. Information about their age, past and current employment, medication and self-perception was requested. The questions were asked to determine if their activity was restricted because of medicine or a physical disability. A list of activities was provided to determine in which, if any, the subjects participated and the frequency of participation. The subjects were aided in completing the form by one of the assistants and then was checked to insure proper completion.

The questionnaires were tallied after the testing was completed to determine whether the subjects were in the active or inactive group of senior citizens. The list of activities was distributed to a jury of five people who have been in contact with senior citizens and who know which activities are physically demanding for them. The jury ranked each activity listed on the survey from one to three, with one being the least demanding and three the most. The scores from each jury member were then recorded and averaged for each activity and the averaged score was used to determine how demanding each activity on the list was for senior citizens. The subjects indicated the frequency of participation in the activity which was quantified as follows. The participant received a rating of four for an activity engaged in five or more times a week; a rating of three for three or four times a week of participation; a rating of two if engaged in an activity two times a week; and a rating of one if engaged once or less times a week in an activity. No points were awarded if the subjects had never participated in an activity.

The averaged number of points for the activity established by the jury and the number for the frequency of participation were multiplied. The product became the score for each activity in which the subjects participated. The values from all the activities one subject participated in were added and the sum became that subject's final score which was used to determine in which group (active or inactive) the subject was placed. This procedure was followed for the other subjects until all were completed. The scores ranged from a high of 60 points to a low of two. The inactive group included those women who scored in the lower 50 percent and the active group were those women who scored in the upper 50 percent. Once all the participants

were placed in a group, a t-test was used to determine if the groups were significantly different.

Testing Procedure

The subjects were given instruction for the strength, balance, and flexibility tests before and during each test. Verbal feedback was given to the subjects during the testing period to encourage continued participation in the testing and to increase their self-confidence during their performance. The following sections describe the procedures used for each test.

Strength Test

The first test administered was the strength test. A modification of the Smedley Dynamometer was used to measure the strength of each subject's dominant hand. The dominant hand was determined by asking which hand was used the most in their daily activities. The hand that was used the most was determined to be their dominant hand and was used for the testing. The hand dynamometer was fitted for the hand by having the subject hold the dynamometer and adjusting the grip to fit the subject's hand size.

Each subject was tested in a standing position with the dynamometer held free from the body. The subject squeezed the hand dynamometer as hard as possible and the score was recorded to the nearest kilogram. The mean of the three trials was the score used for strength.

Balance Test

The second test performed was for balance. One trial was given for the test since there was concern the subject would be too fatigued

to complete the test. An electronic stability platform was used to measure balance. Manufactured by the Lafayette Instrument Company, the stability platform was adjusted to 7-1/2 inches from the base and was 23 inches from the floor to the top of the support post. A special no-slip surface covered the deck to eliminate slipping or falling. The stability platform angle was set at 10 degrees and the subject was considered to be out of balance if the platform was tipped to 10 degrees or beyond. The subject was considered to be in-balance up to 10 degrees. Three 1/100 second stop clocks were used to record the amount of time in-balance and out of balance, either to the right or left.

The subject mounted the platform with the aid of two assistants. The subject grasped the assistants' hands and placed all body weight on the platform and came to a balanced position. The subject then released the assistants' hands and did not touch anything during the test. The assistants stood next to the platform and held or touched the subject's forearms, if necessary, to prevent falling or insecurity. The subject was allowed a brief practice period before the test, followed by several minutes of rest to avoid fatigue. After resting, the subject was helped to the balanced position again and the experimenter activated the timer for thirty seconds. After thirty seconds, the subject grasped the assistants' hands and walked off of the stabilometer. The time to the nearest hundreth of a second was recorded for each position-left, center, and right. The score was a percentage of time the subject remained in-balance.

Flexibility Test

The third and final test measured flexibility. The flexibility

testing box was L-shaped and was 12-1/2 inches in height, approximately 12 inches wide, and was about 21 inches long on the upper lip. The box was made out of metal and was manufactured by Health and Education Services.

Stretching exercises were performed by the subjects before completion of this test. The subjects touched their knees, then slowly and gently reached down their legs to the farthest point without much pain and then stood straight up. The subjects were asked to remove their shoes to allow for conformity in the testing. The testing box was located on a table to eliminate the subjects from lowering and raising themselves from the floor, thus avoiding possible embarrassment from the incapacity to perform these tasks.

The subjects sat on the table with their legs extended and feet flat against the front of the testing box. Their hands were placed next to each other with the index fingers overlapped. The subjects extended their arms and reached forward four times, sliding the indicator as far as possible each time. The next three trials were recorded to the nearest quarter of an inch. The subjects' scores were the best score from the final three trials.

Statistical Procedure

Four scores were derived for each individual for the purpose of this study: the level of activity, balance, flexibility, and strength. Mean scores and standard deviations were computed for the active and inactive groups on each variable. The t-test was utilized to compare the differences of the two groups on each variable at the .05 level of significance with 23 degrees of freedom. T t-score of 2.069 was

needed to produce a significant difference. The calculations were completed on the Victor 3600 programmed calculator.

CHAPTER IV

ANALYSIS OF DATA

This study was conducted to compare the balance, strength, and flexibility of 13 active female senior citizens with 12 female senior citizens who were less active. The tests were administered at one of two Senior Citizens Centers, in central Illinois. A questionnaire was completed by the participants to determine their physical status for placement in the active and inactive groups. The data from the three tests were analyzed by comparing the mean difference of the score of the two groups on each test. This chapter includes the presentation and the discussion of the findings.

Presentation of the Findings

The presentation of the findings has been divided into the following topics: a comparison of the activity levels of active and inactive senior citizens and a comparison of the mean scores of the more active and less active groups on the tests for strength, balance, and flexibility. The data collected for each test has been placed in Appendices B through E.

Comparison of Activity Level of Active and Inactive Groups

The active and inactive groups were formed on the basis of reported activity levels in terms of the intensity and frequency of activity. The active group had a mean score of 38.61 and the inactive group mean score was 10.08. A t-score of 7.46 indicated the two groups differed significantly at the .05 level, as shown in Table 1.

Table 1

A Comparison of the Activity Levels
of the Low Active and High Active Senior Citizens

Group	Activity Level (mean score) Points	Standard Deviation	t-score*
Low Active (n=12)	10.08	5.43	7.46
High Active (n=13)	38.61	12.14	

* t-score needed for .05 level of significance at 23 degrees of freedom was 2.069

Comparison of Strength Levels of Active and Inactive Groups

The inactive and active groups were compared on the basis of strength of the dominant hand and the mean scores, standard deviation, and t-score have been presented in Table 2. The active group had a mean score of 24.15 kilograms and the inactive group mean score was 20.16. A t-score of 1.41 was computed and although the active group had a higher mean strength score, the difference was not significant at the .05 level.

Comparison of Balance Ability of Active and Inactive Groups

The mean score, standard deviation, and t-score for the active and inactive groups on their balance ability appears in Table 3. The active group had a mean score of 54.53 seconds and the inactive group mean score was 46.33. Even though the mean score for the more active group was higher, a t-score of 1.38 indicated there was no significant difference in the mean scores.

Comparison of Flexibility of Active and Inactive Groups

Table 4 reports the mean score, standard deviation, and t-score for the active and inactive groups on the basis of flexibility. A statistical analysis of the two groups revealed a mean score of 16.80 inches for the active group and a mean score of 14.58 for the inactive group. Although the mean score for the active group was greater, a t-score of 1.90 indicated the difference was not significant at the .05 level.

Table 2

A Comparison of Hand Grip Strength
of the Low Active and High Active Senior Citizens

Group	Strength (mean score) kilograms	Standard Deviation	t-score*
Low Active (n=12)	20.16	8.49	
			1.41
High Active (n=13)	24.15	5.41	

* t-score needed for .05 level of significance at 23 degrees of freedom was 2.069

Table 3

A Comparison of Balance Ability
of the Low Active and High Active Senior Citizens

Group	Balance (mean score) seconds	Standard Deviation	t-score*
Low Active (n=12)	46.33	15.67	
			1.38
High Active (n=13)	54.53	13.87	

* t-score needed for .05 level of significance at 23 degrees of freedom was 2.069

Table 4

A Comparison of Flexibility
of the Low Active and High Active Senior Citizens

Group	Flexibility (mean score) inches	Standard Deviation	t-score*
Low Active (n=12)	14.58	2.98	
			1.90
High Active (n=13)	16.80	2.83	

* t-score needed for .05 level of significance at 23 degrees of freedom was 2.069

Discussion

This study was conducted to compare active and inactive female senior citizens on selected tests of strength, balance, and flexibility. A significant difference was found between the activity levels of the more active and the less active senior citizens. Although the high activity group performed better on each of the three tests, the groups did not differ significantly.

The more active subjects generally had better scores on the three tests. Beaulieu (1) stated that the more active individuals do not show as rapid a decrease in their physical abilities as do the less active individuals and this was apparent during the testing. A lower degree of disability or loss was noticed in the more active subjects. It was observed that a lady of 93 years had much better physical capacity than some of the ladies of 60 and 70 years. The older lady indicated she performed headstands and aerobic exercise daily which accounted for her good physical status. The other ladies of various ages who participated in little or no exercise consistently had a greater degree of disability, as seen in their lower scores. The 93 year old lady believed that her exercise program controlled or delayed her aging process. This concept was also expressed by Whiddon and Gilkison (13), who explained that exercise may delay the aging processes.

The subjects who performed little or no physical exercise tended to perform at a lower level on each test but the difference was not significant. de Vries (8) stated that physical exercise can help preserve flexibility and this study indicated the more active subjects tended to have greater flexibility. Behnke et al (2) studied the strength of Eskimos and found little change in the strength of women, which

supported the findings in this study. The tradition of carrying small children on the back and the limited availability of domestic equipment may have been factors which helped Eskimos preserve their strength. The more active subjects in this study tended to have greater strength. Munns indicated that exercise will improve or maintain balance, explained Roberton and Halverson (11) and this study reinforced the statement that the more active subjects had a tendency for better balance. Mravetz (10) stated that "bed rest" or inactivity produced negative physiological changes in subjects, which supported the more active lifestyle for better health. Beaulieu (1) explained that a determining factor of how much flexibility a person has is related to the amount of activity in which the person participates and this was evident during the testing. The more active individuals tended to have better scores.

The degree of loss or disability was not the same when exercise was performed regularly by a subject as when exercise was not performed, which supports the statement made by Behnke et al (2). They reported that the acceleration of loss or disability was not as much as when exercise was performed. Davis (5) reported one reason for lack of coordination and balance was impaired perception of position and relationship in and to space. Subjects who had problems of seeing and hearing, which was either verbally communicated or reported on the questionnaire, performed lower on the balance test.

The more active individuals tended to perform better on the three tests. The exercises the more active individuals performed possibly increased their ability to have better strength, balance, and flexibility. The less active group possibly performed activities which did not increase the three parameters. More research needs to be conducted on these three parameters in the senior citizens.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This study was conducted to determine if there was a difference between active and inactive senior citizens on selected tests of strength, balance, and flexibility. Both active and inactive senior citizens have the common problem of physical aging. Exercise may not be able to stop this process but there is evidence that it may delay the aging processes, according to Corbin (4).

The subjects for this study were 25 female volunteers of varied backgrounds from the Charleston and Mattoon Senior Citizens Centers. The age range was 62 to 93 years of age and the average age was 75 years. The subjects represented a small number of the women who visited the two Senior Citizens Centers on the days the study was conducted.

Instructions for the strength, balance, and flexibility tests were given before and during each test. A modification of the Smedley Dynamometer was used to measure the strength of each subject's dominant hand. The dominant hand was determined by asking which hand was used the most in their daily activities. Each subject was tested in a standing position with the dynamometer held free from the body. The mean of the three trials was the score used.

The test for balance was given on an electronic stability platform. The platform was set at 10 degrees and the subject was considered to be out of balance if the platform was tipped to 10 degrees or beyond. The subject was considered to be in-balance up to 10 degrees. The amount of time in-balance and out of balance was recorded on three 1/100 second stop clocks. The time to the nearest hundreth of a second

was recorded for each position-left, center, and right. The score was a percentage of time the subjects remained in-balance.

The final test was for trunk flexibility and the instrument used was a testing box which was manufactured by Health and Education Services. The subjects performed leg stretching exercises prior to this test and they removed their shoes to allow for conformity in the testing. Four practice trials were allowed, sliding the indicator on the instrument as far as possible each time. The following three trials were recorded to the nearest quarter of an inch and the subjects' scores were the best score from the final three trials.

Conclusions

Based on the findings in the study, the following conclusion has been made:

1. There is no difference between active senior citizens and inactive senior citizens when comparing their strength, balance, and flexibility.

Recommendations

The following recommendations have been made based on the finding in this study:

1. The information in this study could be made available to agencies interested in the well-being of senior citizens.
2. A similar study should be conducted with a larger and more diverse group, including males and females.
3. Future research may include a study of senior citizens who were active when they were young compared to senior citizens who were inactive.

4. Another study could include research on other physical fitness components of senior citizens.

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APPENDIX A

Questionnaire

NAME _____ DATE OF BIRTH _____ SEX _____

Are you retired? Yes _____ No _____

If yes, what position did you hold? _____

If no, what is your present job? _____

During retirement, have you held another job? Yes _____ No _____

If yes, what is that job? _____

Are you currently taking any medication that might affect your mobility, balance, or your nature of movement? Yes _____ No _____

Do you currently have a health problem which restricts physical activity?

Yes _____ No _____ No health problem _____

If yes, would you be more active if you had no health problem?

Yes _____ No _____

If yes, what activities would you participate in? _____

If no, what prevents you from being more active? _____

Do you perceive yourself to be strong enough to do the activities you want to do? Yes _____ No _____

Do you perceive yourself to be flexible enough to do the activities you want to do? Yes _____ No _____

For each activity on the following two pages, select the one category that best describes your participation in that activity.

ACTIVITY	Almost Always 5 or more times a week	Frequently 3 or 4 times a week	Infrequently 2 times a week	Almost Never 1 or less times a week
Aerobic Dance				
Aerobic Exercise				
Archery				
Badminton				
Basketball				
Bicycle riding				
Bowling				
Canoeing				
Clean House				
Climb stairs				
Croquet				
Dancing				
Fishing				
Gardening				
Golf				
Hiking				
Horseshoes				
Hunting				
Ice Skating				
Jogging				
Mow yard				
Racquetball				
Rake Leaves				
Roller skating				
Rope skipping				

ACTIVITY	Almost Always 5 or more times a week	Frequently 3 or 4 times a week	Infrequently 2 times a week	Almost Never 1 or less times a week
Shuffleboard				
Snow removal				
Swimming				
Table tennis				
Tennis				
Volleyball				
Walking				
Weightlifting				
OTHER 1._____ 2._____ 3._____				

SCORE SHEET

NAME OF SUBJECT _____

STRENGTH

TRIAL	SCORE
1	_____
2	_____
3	_____

MEAN SCORE _____

BALANCE

LEFT	CENTER	RIGHT
_____	_____	_____
_____%	_____%	_____%

Score _____

FLEXIBILITY

TRIAL	SCORE
1	_____
2	_____
3	_____

Best Score _____

APPENDIX B

Activity Level Scores

Subject	Low Active	Subject	High Active
HK	17	GL	60
MJ	16	RP	52
FH	16	CM	49
AS	14	DB	48
DF	14	BD	46
GB	12	HT	42
RI	10	SF	38
DS	6	RJ	38
EW	6	MG	31
EM	4	WP	27
LB	4	DR	26
VJ	2	LS	23
		EN	22

APPENDIX C

Strength Scores

Subject	Low Active	Subject	High Active
HK	22	GL	26
MJ	29	RP	19
FH	18	CM	24
AS	22	DB	27
DF	24	BD	19
GB	3	HT	17
RI	15	SF	31
DS	12	RJ	31
EW	20	MG	28
EM	17	WP	17
LB	23	DR	32
VJ	37	LS	21
		EN	22

APPENDIX D

Balance Scores

Subject	Low Active	Subject	High Active
HK	73	GL	31
MJ	36	RP	66
FH	43	CM	73
AS	44	DB	57
DF	47	BD	62
GB	33	HT	72
RI	79	SF	35
DS	34	RJ	57
EW	53	MG	63
EM	31	WP	35
LB	33	DR	59
VJ	50	LS	48
		EN	51

APPENDIX E

Flexibility Scores

Subject	Low Active	Subject	High Active
HK	14.50	GL	11.50
MJ	15.25	RP	13.25
FH	12.00	CM	20.00
AS	12.75	DB	16.75
DF	18.75	BD	15.00
GB	19.25	HT	16.00
RI	18.25	SF	14.00
DS	15.50	RJ	18.50
EW	13.75	MG	17.50
EM	14.00	WP	19.75
LB	10.50	DR	21.25
VJ	10.50	LS	16.75
		EN	18.25

VITA

The writer was born in Sikeston, Missouri on October 25, 1960. She attended Charleston High School in Charleston, Illinois and graduated with honors in June, 1978. While in high school, she participated on the interscholastic track and field and volleyball teams and was awarded the "Outstanding Sportsmanship" award in 1978 for track and field.

The writer attended Eastern Illinois University from 1978 to 1981 and graduated in December, 1981 with a Bachelor of Science degree in Recreation and Leisure Studies. She was a graduate assistant in Gerontology at Eastern Illinois University from 1982 to 1983 and graduated in May, 1983 with a Master of Arts degree in Gerontology. She is currently employed at Urbana Park District as the Senior Citizens Program Supervisor.