

AN ABSTRACT OF THE THESIS OF

Jane A. Barr for the Master of Science Degree  
in Physical Education presented on April 21, 1982

Title: The Effects of a Ten Week Physical Activity Program on  
Fitness Levels of Sixth Grade Students as Measured by the AAHPERD  
Health Related Physical Fitness Test

Abstract approved: Jeanne C. Galley, May 5, 1982

Committee Members: Professor Jeanne C. Galley, Chairperson  
Dr. Ray Heath  
Dr. Patricia J. McSwegin  
Dr. Bill Stinson

Purpose: The purpose of the study was to investigate the effects of a ten week physical activity program on fitness levels of sixth grade students as measured by the AAHPERD Health Related Physical Fitness Test.

Methods of Research: Thirty-eight students in the sixth grade were pre-tested in the following areas: cardio-respiratory function, body composition, and abdominal and low-back hamstring musculo-skeletal function. Twenty students then participated 30 minutes a day, three days a week, for ten weeks in a physical activity program. Eighteen students did not participate in any structured physical education program. Post-testing was then administered to measure changes in the fitness levels of the students. The pre- and post-test scores from the

AAHPERD Health Related Physical Fitness Test were utilized as the data which were analyzed by t-tests and analysis of variance with significance being at the .05 level.

Conclusions: Twenty students in the sixth grade who participated in a ten week physical activity program did significantly improve cardio-respiratory function and abdominal strength and endurance fitness levels as measured by the AAHPERD Health Related Physical Fitness Test. Girls in the experimental group significantly improved their low-back hamstring musculo-skeletal function. Body composition did not change significantly in the experimental group.

Eighteen students in the control group who did not participate in any structured physical education program made no significant change in their cardio-respiratory function, body composition, or abdominal strength and endurance. Girls in the control group made a significant change in their low-back hamstring musculo-skeletal function.

THE EFFECTS OF A TEN WEEK PHYSICAL ACTIVITY PROGRAM  
ON FITNESS LEVELS OF SIXTH GRADE STUDENTS AS MEASURED BY  
THE AAHPERD HEALTH RELATED PHYSICAL FITNESS TEST

---

A Thesis  
Presented to  
the Division of Health, Physical Education,  
Recreation and Athletics  
EMPORIA STATE UNIVERSITY

---

In Partial Fulfillment  
of the Requirements for the Degree  
Master of Science

---

by  
Jane A. Barr  
May, 1982

Thesis  
1982  
B

Jeanne C. Galley  
Approved for the Major Department

Harold E. Dunt  
Approved for the Graduate Council

430221

D.P.  
AUG 04 1982



## ACKNOWLEDGMENTS

I extend my sincere and deep appreciation to Professor Jeanne C. Galley, Dr. Ray Heath, Dr. Patricia J. McSwegin, and Dr. Bill Stinson for their expert guidance, recommendations and assistance in conducting this study. Without their help, this research would not have successfully been completed.

Also, a special thanks to David Leitch, M.D. and Faye Hermreck for screening the students prior to the testing. Their token of time and expertise, not only helped to make this study safe, but also more meaningful. Appreciation goes to Larry Stewart and Dennis Hippe, building principals for their cooperation and congeniality in making this research possible. A thank you also goes to the classroom teachers who rearranged schedules to help the operation run smoothly.

Last, but not least, a special thanks to the sixth grade students who were involved in this study. Gratitude is felt for their superb cooperation, positive attitudes, and efforts in making this a successful experience.

## CONTENTS

	Page
LIST OF TABLES . . . . .	iv
Chapter	
1. INTRODUCTION . . . . .	1
Theoretical Formulation . . . . .	1
The Problem . . . . .	2
Statement of the Problem . . . . .	3
Statement of the Hypothesis . . . . .	3
Assumptions of the Study . . . . .	3
Purpose of the Study . . . . .	4
Significance of the Study . . . . .	4
Definitions of Terms . . . . .	4
AAHPERD . . . . .	5
Aerobic Exercise . . . . .	5
Body Composition . . . . .	5
Cardio-respiratory Endurance . . . . .	5
Flexibility . . . . .	5
Health Related Aspects of Fitness . . . . .	5
Low-Back Hamstring Musculo-skeletal Function . . . . .	6
Muscular Endurance . . . . .	6
Physical Fitness . . . . .	6
Limitations of the Study . . . . .	6
Delimitations . . . . .	7
2. REVIEW OF RELATED LITERATURE . . . . .	8

	Page
3. METHODS AND PROCEDURES . . . . .	12
Population and Sampling . . . . .	12
Materials and Instrumentation . . . . .	13
Design of the Study . . . . .	13
Data Collection . . . . .	15
Data Analysis . . . . .	15
4. ANALYSIS OF DATA . . . . .	16
Nine-Minute Run . . . . .	16
<u>t</u> -test Analysis of Data . . . . .	16
Analysis of Variance . . . . .	19
Body Composition . . . . .	20
<u>t</u> -test Analysis of Data . . . . .	20
Analysis of Variance . . . . .	20
Sit-ups . . . . .	21
<u>t</u> -test Analysis of Data . . . . .	21
Analysis of Variance . . . . .	23
Sit and Reach . . . . .	24
<u>t</u> -test Analysis of Data . . . . .	24
Analysis of Variance . . . . .	27
Summary . . . . .	27
5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS . . . . .	30
Summary . . . . .	30
Conclusions . . . . .	33
Recommendations for Further Study . . . . .	34
REFERENCES . . . . .	36

## APPENDIXES

A. Tables . . . . .	39
B. Information Letter to Parents . . . . .	52
C. Physical Examination Form . . . . .	55
D. Testing Procedures . . . . .	58
E. Physical Activities . . . . .	61
F. Participation Certificate . . . . .	65
G. Personal Data Sheet . . . . .	67

## TABLES

Table	Page
1. <u>t</u> -table for Post 9-Minute Run for Experimental and Control Groups . . . . .	17
2. <u>t</u> -table for Pre-test 9-Minute Run for Boys and Girls in Experimental Group . . . . .	18
3. <u>t</u> -table for Post-test of 9-Minute Run for Boys and Girls in Experimental Group . . . . .	18
4. <u>t</u> -table for Pre-Test Sit-up Scores for Boys and Girls in Experimental Group . . . . .	22
5. Analysis of Variance for the Sit-up Test for Experimental Group . . . . .	23
6. <u>t</u> -table for Sit and Reach Pre-Test for Experimental and Control Groups . . . . .	24
7. <u>t</u> -table for Sit and Reach Post-Test for Experimental Boys and Girls . . . . .	25
8. <u>t</u> -table for Sit and Reach Post-Test for Control Boys and Girls . . . . .	26

## Chapter 1

### INTRODUCTION

This chapter has been devoted to information concerning the effects of a ten week physical activity program on physical fitness levels of sixth grade students as measured by the AAHPERD Health Related Physical Fitness Test. The significance of the study, the specific statement of the problem, the purpose, the null hypothesis, and the assumptions for the study have been discussed. The limitations and de-limitations imposed on this study by uncontrolled variables as well as terms identified as needing further clarification have been defined and included in this chapter.

#### Theoretical Formulation

Lack of physical fitness is one of the country's greatest health problems. Non-participation in regular physical activity contributes to health problems such as hypertension, chronic fatigue, physical inefficiency, mental tension, coronary heart disease, obesity, and the poor musculature and lack of flexibility which are the major causes of lower back problems and injuries. (4)

Medical authorities are recognizing our best hope for improving health and the quality of living lies in prevention. It is not merely the most practical course, it may be the only course we can afford. Now that our cost of indulgence is finally catching up with us, it may be we can no longer buy our way out of health difficulties.

The alternative is to focus attention on the underlying conditions and causes of controllable diseases rather than to concentrate on the diseases themselves. (4)

Prevention starts with teaching children positive health habits early in life. All children have the right, as well as the need, to become physically fit. Children should have the opportunity to learn concepts, skills, and positive attitudes about physical activity and fitness. It is the responsibility of the school to provide opportunities for them to achieve this physical goal -- developing and maintaining a level of physical fitness that allows them to live full, healthy lives. (8)

#### The Problem

Can significant changes be made in the cardio-respiratory function, body composition, and abdominal and low-back hamstring musculo-skeletal function of sixth grade children who participate in a ten week physical activity program? Will there be significant changes in the fitness levels of the sixth graders in the physical activity program as compared to a group of sixth graders with no structured physical education program? Will there be significant changes in the fitness levels tested between boys and girls in the physical activity program? Will there be significant changes in the fitness levels of the boys and girls who did not have a structured physical program?

### Statement of the Problem

Does a ten week physical activity program for sixth grade students significantly change their fitness levels as measured by the AAHPERD Health Related Physical Fitness Test?

### Statement of the Hypothesis

#### (Null Form)

There is no significant difference in the effects of a ten week physical activity program on fitness levels of sixth grade students as measured by the AAHPERD Health Related Physical Fitness Test.

There is no significant difference in the test data of fitness levels as measured by the AAHPERD Health Related Physical Fitness Test in sixth grade students participating in a ten week physical activity program and sixth grade students having no structured physical education program.

There is no significant difference in the test data of fitness levels as measured by the AAHPERD Health Related Physical Fitness Test between sixth grade boys participating in a ten week physical activity program and sixth grade girls participating in the same ten week program.

There is no significant difference in the test data of fitness levels between sixth grade boys having no structured physical education program and sixth grade girls having no structured physical education program.

### Assumptions of the Study

The subjects were from populations of sixth grade students in which individual differences in the beginning level of physical fitness



would not affect the results of the study. No students did any additional structured training to affect the final results. All measurements taken were observable and measurable. Validity and accuracy of the instrument were assumed correct as substantiated by the AAHPERD Health Related Physical Fitness Test. Validity and accuracy of test scores measured by the researcher were also assumed correct.

#### Purpose of the Study

The purpose of the study was to investigate the effects of a ten week physical activity program on fitness levels of sixth grade students as measured by the AAHPERD Health Related Physical Fitness Test. The physical activity program was designed to improve cardio-respiratory function, body composition and abdominal and low-back hamstring musculo-skeletal function in sixth grade children.

#### Significance of the Study

The significance of this study was to show that positive changes can occur by participation in a ten week physical activity program designed to improve the areas of cardio-respiratory function, body composition and abdominal and low-back hamstring musculo-skeletal function in sixth grade students. Finally, this experiment provided research data regarding initial levels of fitness and possible maturation changes in fitness levels of sixth grade children.

#### Definition of Terms

The following terms were defined to elucidate the meaning of material throughout the study.

AAHPERD

American Alliance For Health, Physical Education, Recreation and Dance. (1)

Aerobic Exercise

Exercise for which the body is able to supply adequate oxygen to sustain performance for long periods of time. (5)

Body Composition

The relative percentage of muscle, fat, bone, and other tissue of which the body is composed. A fit person has a relatively low percentage of body fat. (5)

Cardio-respiratory Endurance

The ability of the lungs and heart to take in and transport adequate amounts of oxygen to the working muscles, allowing activities that involve large muscle masses (e.g., running, swimming, bicycling) to be performed over long periods of time. (9)

Flexibility

The range of motion about a joint; opposition or resistance of a joint to motion, with particular interest in the low-back flexibility. (9)

Health Related Aspects of Fitness

Cardio-respiratory function, body composition, and abdominal and low-back hamstring musculo-skeletal function. Refers to those aspects of physiological functioning which are believed to offer some

protection against degenerative type diseases such as coronary heart disease, obesity, and various musculo-skeletal disorders, specifically low-back pain. (10)

#### Low-Back Hamstring Musculo-skeletal Function

Flexibility of the low back and posterior thighs, also includes abdominal strength and endurance. (1)

#### Muscular Endurance

The capacity of the muscle to continue contracting over a period of time, i.e. abdominals. (5)

#### Physical Fitness

Physical fitness is a multi-faceted continuum extending from birth to death. Affected by physical activity it ranges from optimal abilities in all aspects of life through high and low levels of different physical fitness, to severely limiting disease and dysfunction. (1)

#### Limitations of the Study

Limitations of this study included individual differences in physical ability and individual differences of the initial physical fitness levels. Thirty minutes a day, three times a week for ten weeks would possibly be a limiting factor in bringing about physiological changes. The number of boys and girls in each group was not exactly the same. There was no control over any additional activities and/or recess time of either group of sixth graders. There was also no

control over how much additional activity subjects performed outside of school. Absences of individual students and school days missed because of snow days or other reasons were not taken into consideration. Diet and/or caloric input were not monitored. Activities were indoors and outdoors depending on the weather. Maturation in this age group was another uncontrollable factor, along with sex differences. Nervousness, anxiety, individual effort and motivation would be factors affecting tests scores. Familiarity in taking a test the second time should help to improve some scores. Also, perhaps children who have not had a physical education program start at lower fitness levels and improve more readily than ones at a higher level of fitness.

#### Delimitations

Permission from administrators including the superintendent, school board, and building principals was necessary before commencement of this project. Since the participants were children, parental permission was required before testing was started. Scheduling had to incorporate factors such as convenience for classroom teachers and availability of facilities. Both elementary schools had a 15 minute recess in the morning and afternoon in addition to 5-10 minute break at noon. These breaks were not monitored for any differences in time or for the activities in which students participated. Motivation and individual effort were key factors in determining improvement on the test scores.

## Chapter 2

### REVIEW OF RELATED LITERATURE

Health-related physical fitness refers to those aspects of physiological functioning which are believed to offer some protection against degenerative type disorders such as coronary heart disease, obesity, and various musculo-skeletal disorders. (1, 10) All aspects of physical fitness are important; however, the aspects of cardiovascular fitness, muscular endurance and strength, body composition, and flexibility are most important to good health. (5)

In a study conducted in the public schools of Iowa, more than 5,000 children between the ages of 6 and 18 were examined over a two-year period. Seventy percent of the children had some symptoms of coronary heart disease. Seven percent had extremely high cholesterol levels, a large percentage had developed high blood pressure and at least twelve percent were overweight by at least twenty percent. (10)

Wilmore and McNamara examined 95 boys, 8-12 years of age, in an effort to determine the extent to which coronary heart disease risk factors derived from an adult population were evident in a group of young boys. This study and similar studies concluded that coronary heart disease, once considered to be a geriatric problem, is now recognized as being largely of pediatric origin. (3, 14, 18)

Children show positive improvement with exercise and movement designed for optimum development of the cardiovascular system (16, 23, 24).



Researchers have found that youngsters are capable of high output and outstanding physical performance by gradually increasing the physical demands placed on them. (9, 4, 7)

Another important health-related aspect of fitness which relates to cardiovascular function is obesity or overfatness. Research evidence indicates that:

. . . complications associated with obesity are far-reaching, being associated with serious organic impairments and shortened life, with psychological maladjustments, with unfortunate peer relationships (especially among children); with inefficiency of physical movement, and with ineffectiveness in motor and athletic activities. Obesity is consistently encountered as a cause of physical unfitness among boys and girls, men and women. Fat people have a higher frequency of respiratory infections, a prevalence of high blood pressure and atherosclerosis, and are prone to disorders of the circulatory, respiratory and kidney systems. (5:60)

A fit person has a relatively low percentage of body fat. Evaluation of body composition or the relative percentages of fat and fat-free body mass tells a person whether he or she is overfat. The American Medical Association has estimated 40 percent of school children are considered overweight. Obese children are much more likely to be fat adults than are their non-fat peers. (19)

Interestingly enough, movement and/or activity may be the crucial factor in weight control. (9, 19) In comparisons of diets of obese and normal children, usually no substantial difference in caloric consumption is found. In fact, in some cases, obese and very heavy children actually consumed less food than normal-weight children. In a study of high school-age girls, it was found girls who were obese ate less and exercised two-thirds less than normal-weight girls. (6)

Children in an elementary school gained more weight in winter when they were less active. Movies taken of normal and overweight children have demonstrated there was a wide difference in activity levels of the two groups even though their diets were quite similar. (6, 17)

The importance of strength to general health is not as apparent as cardiovascular fitness and good body composition. Stronger muscles offer better protection to the joints they cross. The stronger individual is less susceptible to strains, sprains and pulls. Better tone in muscles of the trunk helps to prevent some of the more common postural problems that annoy us such as sagging abdominal organs, round shoulders and low-back pain. (11)

Flexibility refers to the degree to which a joint may move through its maximum possible normal range of motion. From a health standpoint, loss of joint flexibility often contributes to postural difficulties. Loss of flexibility in the average individual may result in misalignment of body structures, crowding of internal organs and/or low-back pain. Recent studies show that the most frequent underlying cause of low-back pain is lack of proper exercise. (10)

One study of 5,000 patients with back pain revealed that 80 percent were diagnosed as being caused by lack of flexibility or weak muscles. (9)

Saltin (22) did a study to determine whether any of the benefits of childhood activity carried over into adult life. It was found that functional adult capacity appeared to be a partial function of activity during the growing years. The need for activity and movement

in the formative years of life appears an important aid in the development of a strong and functional body. (8)



## Chapter 3

### METHODS AND PROCEDURES

This chapter described the methods and procedures utilized in the study of the effects of a ten week physical activity program on fitness levels of sixth grade students as measured by the AAHPERD Health Related Physical Fitness Test. The design of the study, the instrument administered, the population involved, as well as the sampling procedures have been presented. In addition, data collected and the methods used for statistical analysis of the data have been included in this chapter.

#### Population and Sampling

The subjects for this study were selected from two elementary schools. The experimental group was a class of 20 sixth graders containing 14 boys and 6 girls who participated in a ten week physical activity program. The control group contained 18 sixth graders with 8 boys and 10 girls who had no structured physical education program during the ten week time period. Neither group had participated in a structured physical education program because their school did not offer physical education classes due to monetary and facility limitations. The groups were small partly due to the fact they were from two different elementary schools in a small community. The experimental group of sixth graders were from one elementary school in the

community who had parental permission and were willing to participate in the study. Sixth graders from another elementary school in the same community who also had permission from their parents and were willing to participate in this study comprised the control group.

### Materials and Instrumentation

Guidelines in the AAHPERD Health Related Physical Fitness Test Manual were followed for obtaining data for this study. Areas tested included cardio-respiratory function, body composition, and abdominal and low-back hamstring musculo-skeletal function. The tests evaluating each of these areas included a 9-minute run which measured the cardio-respiratory function; a tricep and subscapular skinfold measurement which evaluated the body composition; and sit-up and sit and reach test which measured abdominal and low-back hamstring musculo-skeletal function. Children paired off for counting laps and sit-ups while the researcher timed and supervised these two tests. The primary investigator administered the skinfold and sit and reach tests without assistance.

### Design of the Study

Prior to the pre-test, information letters and parental consent forms were sent to parents of students who participated in this study. For the safety of the students and in the best interest of everyone involved in this study, a physician examined and screened each student who participated. Blood pressure, urine analysis and heart rate were

some of the particulars examined. (See Appendix C for a sample copy of the physical examination form).

Both groups were tested by the primary researcher using the AAHPERD Health Related Physical Fitness Test to measure their level of fitness in the following areas: cardio-respiratory function, body composition, abdominal and low-back musculo-skeletal function. Prior to all testing, both groups were given instructions and demonstrations of how to do the tests. Warm-up and stretching exercises were done by both groups prior to testing. Sit-ups and sit and reach tests were tested one day with the 9-minute run and skinfold test being administered two days later.

The experimental group participated in a physical activity program designed and taught by the primary researcher for three days a week, 30 minutes a day for ten weeks. The control group did not participate in any structured physical activity program during those ten weeks. Both groups were retested using the same four tests and procedures at the end of ten weeks.

Activities taught to the experimental group were designed by the primary researcher to improve the areas tested. Aerobic activities such as parachute activities, jump roping, tag games, and Troika dance were used to improve cardio-respiratory function and body composition. (8, 12) A progressive run which started with running three minutes a session and working up to twelve minutes a session was also done to improve cardiovascular endurance. (8) Stretching exercises and sit-ups were included in the warm-up routine at the beginning of each

session. (2) (For more specific details of other activities, see Appendix E., p. 61).

### Data Collection

The raw scores of each individual who participated in the AAHPERD Health Related Physical Fitness Test were recorded at the time of the testing by the researcher. Percentile scores were later recorded with the raw scores to interpret the ranking of how each student performed on each test. Certificates and personal data sheets were given to each child.

### Data Analysis

An analysis of the data of the effects of a ten week physical activity program on the fitness levels of sixth grade students as measured by the AAHPERD Health Related Physical Fitness Test was based on the pre- and post-test scores for the experimental and control groups. The analysis of variance (ANOVA) test was used to analyze the changes in fitness levels of the control and experimental groups. Also, t-tests were used to determine if a significant difference occurred in fitness levels between the two groups (pre- and post-test; boys vs girls). The two statistical tests, Fortran programs USSTOV12 and USSTOV18 were used to compute and analyze the data. (21) The .05 level of significance was used to test the null hypothesis of the study.

## Chapter 4

### ANALYSIS OF DATA

This chapter contains the analysis of data for the 9-minute run, body composition, sit-up test, and sit and reach test for both groups. The statistical procedures used for analysis included the t-test and analysis of variance.

#### NINE-MINUTE RUN

The 9-minute run was administered prior to and following a ten week physical activity program to the experimental and control groups. The mean scores of the pre- and post-tests for each group were subjected to the t-test to determine if a significant difference existed at the .05 level. Additional statistical procedures included the analysis of variance.

#### t-test Analysis of Data

The experimental group had a mean score of 1476.350 yards for the pre-test with a standard deviation of 265.390. The control group had a mean score of 1513.278 yards with a standard deviation of 297.845. As seen in Table 1, the mean post-test score for the experimental group was 1644.00 yards with a standard deviation of 260.941; the control group, 1476.389 yards with a standard deviation of 159.05.

Table 1

t-table for Post 9-Minute Run Scores  
for Experimental and Control Groups

Source	df	Mean	Standard Deviation	<u>t</u>
Experimental	36	1644.000	260.94	2.356*
Control	36	1476.389	159.505	

\*significant at the .05 level, with df=30

From the statistical data, a t-test value  $\geq 2.042$  was necessary at the .05 level to be significant, using thirty degrees of freedom. A t-test value of 2.356 was calculated and was significant at the .05 level.

The results of the data disclosed that there was no significant difference in the pre-test scores of the two groups as illustrated in Table 8, p. 26. There was significant difference in the post-test scores as shown in Table 1. The progressive running and aerobic activities used with the experimental group could be considered successful in developing cardio-respiratory endurance. This change in fitness level agreed with other studies done with children. (7) Recess or unstructured activity did not increase cardiovascular endurance in the control group. Gilliam did a study which showed children were seldom active enough to have heart rates greater than the minimum needed to promote cardiovascular health. (20)

Table 2 and 3 indicate the pre- and post-test scores of the boys and girls in the experimental group. The boys had a mean pre-test



score of 1579.143 yards with a standard deviation of 227.246; while the girls had a pre-test score of 1236.500 yards with a standard deviation of 186.438. On the post-test, the boys had a score of 1722.428 yards and a standard deviation of 273.295; the girls, 1461.00 yards with a standard deviation of 84.538.

Table 2

t-table for Pre-test of 9-Minute Run  
for Boys and Girls in Experimental Group

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	18	1579.143	227.246	3.241**
Girls	18	1236.500	186.438	

\*\*significant at the .01 level, with df=30

Table 3

t-table for Post-test of 9-Minute Run  
for Boys and Girls in Experimental Group

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	18	1722.428	273.295	2.265*
Girls	18	1461.000	84.538	

\*\*significant at the .05 level, with df=30

A t-test value of 3.241 on the pre-test scores was calculated from the statistical data. A value for  $t \geq 2.750$  was necessary at the

.01 level;  $t \geq 2.042$ , at the .05 level. The  $t$ -test value on the post-test was 2.265, being significant at the .05 level.

The results of the data analysis showed that there was significant difference in the cardio-respiratory endurance scores as measured by the 9-minute run for the boys and girls in the experimental group. These results showed that in this group of sixth graders, the boys scored significantly better than the girls on both the pre- and post-tests. Both boys and girls improved their cardiovascular endurance after the 10 week physical activity program, but the boys scored significantly better. This outcome agrees with other studies that by age 12-13 years, boys tested in maximal oxygen consumption normalized by body weight, favor boys vs girls. (9)

The pre- and post-test mean scores for the boys and girls in the control group were not significantly different at the .05 level. The  $t$ -test value on the pre-test was 1.094; .637 on the post-test. In this group of sixth graders, the boys had a higher mean score on both pre- and post-test but were not significantly different than the girls at the .05 level (Table 9, p. 40).

#### Analysis of Variance

The results of the analysis of variance for the pre-and post-test scores on the 9-minute run for the experimental group did not show a significant difference at the .05 level. The  $F$ -ratio was 3.6989 as shown in Table 10, p. 40. The  $F$ -ratio  $\geq 4.17$  was necessary at the .05 level, with 38 degrees of freedom.



The results of the analysis of variance on the pre- and post-tests for the control group also were not significant. This group had an F-ratio value of 0.2144. An F-ratio value of  $\geq 4.17$ , with 38 degrees of freedom was necessary to be significant at the .05 level.

#### BODY COMPOSITION

Lange calipers were used to take the two skinfold measurements at the tricep and subscapular sites. Measurements were taken prior to and after the ten week physical activity program on both the experimental and control groups. All measures were analyzed using the t-test and analysis of variance.

#### t-test Analysis of Data

Mean pre- and post-test scores of the experimental and control groups showed no significant differences at the .05 level. Mean pre- and post-test scores of the boys and girls in the experimental group showed no significant difference at the .05 level. The girls and boys in the control group also showed no significant difference at the .05 level in their mean pre- and post-test scores.

#### Analysis of Variance

Measurements were statistically treated with the analysis of variance to determine if a significant difference existed between groups or within groups on the pre- and post-tests. The results showed there were no significant differences in the pre- and post-test of the experimental group. An F-ratio of 0.131 was computed. An F-ratio

$\geq 4.17$  at the .05 level with 38 degrees of freedom was necessary to be significant. The control group also showed no significant difference on their pre- and post-test scores. Their F-ratio was 0.8216, needing also an F-ratio  $\geq 4.17$  at the .05 level to be significant.

#### SIT-UPS

The sit-up test was administered prior to and following a ten week physical activity program to both the experimental and control groups. The mean scores of the pre- and post-tests for both groups were subjected to the t-test to determine if a significant difference existed at the .05 level. An analysis of variance was also computed.

#### t-test Analysis of Data

The mean pre-test score of the experimental group was 25.9; the control group, 31.056. These scores indicated no significant difference at the .05 level. On the post-test, the experimental group improved to a score of 34.800; the control remained at 31.278. Again, there was no significant difference in the post-test scores. A t-test value  $\geq 2.042$  was necessary at the .05 level with 30 degrees of freedom. The pre-test evidenced -1.654; the post-test, 1.534.

Table 4 shows the boys in the experimental group had a mean score of 28.643 on the pre-test with a standard deviation of 8.776. The pre-test mean score for the girls in the experimental group was 19.500 with a standard deviation of 7.232.

Table 4

t-table for Pre-Test Sit-up Scores for  
Boys and Girls in Experimental Group

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	18	28.643	8.776	2.237*
Girls	18	19.500	7.232	

\*significant at the .05 level, with df=30

From the statistical data a t-test value of 2.237 was calculated. A value for  $\underline{t} \geq 2.042$  was necessary at the .05 level to be significant, using 30 degrees of freedom. The post-test mean scores of the boys improved to 36.429 with a standard deviation of 8.706; the girls; 31.00 with a standard deviation of 4.899. These post-test scores demonstrated no significant difference between boys and girls after the 10 week physical activity program. The t-score on the post-test was 1.420. A t-value  $\geq 2.042$  was necessary to be significant at the .05 level as illustrated in Table 24, p.47. The girls improved enough to prevent a significant difference in boys and girls in abdominal strength and endurance after the 10 week physical activity program.

The mean pre- and post-test scores for the boys and girls in the control group showed no significant difference. The mean score on the pre-test for the boys was 32.750; the girls, 29.700. The post-test mean scores for the boys was 31.875; the girls 30.800. These computed a t-value of 0.631 on the pre-test; 0.382, on the post-test. A t-value  $\geq 2.042$  was necessary to be significant at the .05 level.

### Analysis of Variance

The results of the analysis of variance for the pre- and post-test scores for the experimental group in sit-ups were illustrated in Table 5. The between groups, with 1 degree of freedom had a mean square of 792.0977, while the sum of squares was also 792.0977. The mean square for the within group variance was 74.8159 with 38 degrees of freedom. The sum of squares for within groups was 2843.0039. The sum of squares for total variance was 3635.1016 with 39 degrees of freedom.

Table 5

Analysis of Variance for the Sit-up  
Pre- and Post-test for Experimental Group

Source	df	Sum of Squares	Mean of Squares	<u>t</u>
Between	1	792.0977	792.0977	10.5873**
Within	38	2843.0039	74.8159	
Total	39	3635.1016		

\*\*significant at the .01 level, df=1,38

An F-value of 10.5873 resulted indicating that a significant difference existed after the 10 week physical activity program on the sit-up test in the experimental group. An F-ratio  $\geq 7.56$  was necessary to be significant at the .01 level. The analysis of variance between groups for the control group showed no significant difference at the .05 level. The F-ratio, as shown in Table 27, p. 49, was .0066. The F-ratio  $\geq 7.56$  was necessary to be significant at the .05 level.

## SIT AND REACH

The sit and reach test was administered prior to and following a ten week physical activity program to the experimental and control groups. The mean scores of the pre- and post-tests were subjected to the  $t$ -test to determine if a significant difference existed at the .05 level. An analysis of variance was also computed.

t-test Analysis of Data

As shown in Table 6, the experimental group had a mean score of 21.100 centimeters with a standard deviation of 6.025 on the pre-test. The control group had a mean score of 26.444 centimeters with a standard deviation of 4.718 on the pre-test.

Table 6

$t$ -table for Sit and Reach Pre-Test Scores  
for Experimental and Control Groups

Source	df	Mean	Standard Deviation	$t$
Experimental	36	21.100	6.025	-3.020**
Control	36	26.444	4.718	

\*\*significant at the .01 level, df=30

From the statistical data, a  $t$ -test value of -3,020 was calculated. A value for  $t \geq 2.750$  was necessary at the .01 level to be significant, using 30 degrees of freedom.

The post-test mean score of the experimental groups was 23.750 centimeters; the control group, 27.833 centimeters. A  $t$ -value of -1.909 was calculated for the post-test. A  $t$ -value  $\geq 2.750$  was necessary to be significant.

The results of the data showed that the two groups started at a significantly different level of flexibility as measured by the sit and reach test, with the control group having a higher mean score. On the post-test, both groups had improved with the experimental group improving enough to prevent a significant difference in the groups.

The pre-test mean scores of the boys and girls in the experimental group showed no significant difference. The boys scored 20.214 centimeters; the girls, 23.167 centimeters. Table 7 illustrated the mean post-test scores for the boys and girls in the experimental group. The boys had a mean score of 21.500 with a standard deviation of 7.573; the girls, 29.000 centimeters with a standard deviation of 4.517.

Table 7

$t$ -table for Post Sit and Reach Scores  
for Boys and Girls Experimental Group

Source	df	Mean	Standard Deviation	$t$
Boys	18	21.500	7.573	-2.240*
Girls	18	29.000	4.517	

\*significant at the .05 level, df=30



A t-test value of -2.240 was calculated. A value for  $t \geq 2.042$  was necessary at the .05 level to be significant, using 30 degrees of freedom.

The results of the data indicated that before the ten week activity program, boys and girls in the experimental group were not significantly different in flexibility as measured by the sit and reach test. After 10 weeks, both boys and girls had improved, but especially the girls improved enough to make a significant difference. Studies have also found that elementary girls were superior to boys in flexibility. (9) It is likely that the difference exists at all ages and throughout adult life.

The mean scores of the pre-test for the boys and girls in the control group were not significant. As illustrated in Table 8, the post-test scores of the boys and girls in the control group showed significance at the .01 level. The mean scores for the boys stayed about the same as the pre-test scores, from 24.625 to 24.500 centimeters. The mean scores for the girls changed from 27.900 to 30.500 centimeters.

Table 8

t-table for Post-test Sit and Reach of  
Boys and Girls in Control Group

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	18	24.500	3.586	-2.844**
Girls	18	30.500	5.017	

\*\*significant at the .01 level, df=30

From the statistical data, a t-test value of -2.844 was calculated. A value for t  $\geq$  2.750 was necessary at the .01 level, using 30 degrees of freedom.

As mentioned earlier, girls have demonstrated greater flexibility than boys at all ages. Perhaps girls also do activities which include stretching and flexibility exercises in their unstructured play.

#### Analysis of Variance

The analysis of variance for the experimental group showed no significant difference at the .05 level, similarly for the control group. The F-ratio was 1.5047 for the experimental; 0.6905 for the control. An F-ratio  $\geq$  4.17 at the .05 level was necessary with 1 and 38 degrees of freedom.

#### SUMMARY

The results of the t-tests indicated that the experimental group showed significant improvement on the 9-minute run after the ten week physical activity program. Boys and girls in the experimental group were significantly different on the pre- and post-tests of the 9-minute run, with boys scoring significantly better on both tests. Boys and girls in the control group showed no significant difference on the 9-minute run.

The body composition t-tests showed no significant changes on any of the tests. The experimental group did improve slightly on the



post-test, but not significantly. The control group increased their fat level on the post-test, but again not significantly.

There were no significant changes in the mean scores of the sit-up test of the experimental and control groups in the t-test. Boys and girls in the experimental group showed significant differences on the sit-up pre-test, but not on the post-test. Boys and girls in the control showed no significant differences on either sit-up test.

On the sit and reach test, the control group scored significantly higher on the pre-test; on the post-test, there was no significant difference between the groups. Starting with no significant differences between the boys and girls in both groups on the sit and reach test, the girls scored significantly higher on the post-test.

The analysis of variance showed a significant difference in the sit-up test in the experimental group. No significant differences existed in any of the other tests in the analysis of variance for either group.

Based on the analysis of data, the null hypothesis was rejected. There were significant difference in the pre- and post-test data of fitness levels of sixth grade students participating in a ten week physical activity program as measured by the AAHPERD Health Related Physical Fitness Test.

There were significant changes in the fitness levels of sixth graders in the physical activity program as compared to sixth graders with no structured physical education program.

There were significant differences in the fitness levels tested between boys and girls who participated in the ten week activity program. There were significant differences in fitness levels of boys and girls who did not have a structured physical education program.

## Chapter 5

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This study was completed to determine if there were a significant difference in the effect of a ten week physical activity program on test data of fitness levels of sixth grade students as measured by the AAHPERD Health Related Physical Fitness Test. Data were collected and analyzed as previously described in Chapters 3 and 4.

#### SUMMARY

No significant difference existed between the experimental and control groups on the pre-test 9-minute run, but the experimental group improved to cause a significant difference between the groups on the post-test. An increase in the cardiovascular endurance of the experimental group after the ten week physical activity program when compared to the control group was expected.

Analysis of variance showed that the control group made no significant changes on the pre- and post-tests of any of the four areas tested. There evidently was no maturation change which affected the areas tested. Also, this reinforces the importance of structured physical activity program for children. Recess was not enough. Children in the control group were not active enough to produce physiological changes in their fitness levels.

There were no significant changes in body composition in either group on the pre- and post-tests. It was anticipated that there would not be a significant change in body composition within a ten week time period. Body composition does not change rapidly. The experimental group improved their body composition measurements on the post-test, but not significantly. The control group had larger fat measurements on the post-test, but not significantly larger. This could have been partly due to error in measurement. There was no significant difference in boys and girls in both groups on the body composition measurements of pre- and post-tests. Girls showed higher fat measurements, but not significantly higher. Girls would be expected to have higher body fat than boys. Besides sex differences, maturation in this age group would be changing and would have an effect on the measurement,

Analysis of variance showed that the experimental group improved significantly in the sit-up test at the .01 level. Abdominal strength can change within a short time if done regularly. Since sit-ups were done each session, significant improvement would be expected.

The boys and girls in the control group showed no significant difference in the pre- and post-test of the 9-minute run or sit-up test. Again, there was no maturation change which affected the control group in abdominal strength and endurance or cardiovascular function.

The experimental group scored significantly lower on the pre-test than the control group on the sit and reach test at a .01 level, but improved to show no significant difference on the post-test. Flexibility stretching exercises were also done each session and improvement was

expected from the experimental group. Flexibility decreases without doing proper stretching exercises. The analysis of variation indicated no significant change in the flexibility of the experimental group on their pre and post-test. There was an improvement which was anticipated.

Girls in the experimental group scored significantly higher than the boys on the sit and reach post-test at a .05 level. Girls in the control group scored significantly higher than the control boys on the sit and reach post-test at a .01 level. This was expected because of sex differences in flexibility. The researcher was uncertain whether the differences between boys and girls would be significant without further study.

Boys in the experimental group scored significantly higher than the girls on the pre-test 9-minute run at the .01 level; on the post-test, at the .05 level. Sex differences would be anticipated between boys and girls. At this age, rapid maturation changes were normal which would explain why the control group showed no significant differences between the sexes in the 9-minute run of either pre- or post-test.

Girls in the experimental group scored significantly lower on the sit-up pre-test at the .05 level, but showed no significant difference between the boys on the sit-up post-test. The researcher found this phenomena difficult to explain, unless this particular group of girls worked harder than the boys on the sit-ups during daily sessions and/or during post-testing.

### CONCLUSIONS

From the results of the statistical analysis and within the limitations of this study conclusions were made. They include the following deductions.

A physical activity program done thirty minutes a day, three times a week, for ten weeks did significantly improve cardio-respiratory endurance and abdominal strength and endurance in sixth grade students as measured by the AAHPERD Health Related Physical Fitness Test.

A physical activity program done thirty minutes a day, three times a week for ten weeks did improve, but not significantly, body composition and low-back hamstring musculo-skeletal function in sixth grade students as measured by the AAHPERD Health Related Physical Fitness Test.

Sixth grade boys who participated in a ten week physical activity program thirty minutes a day, three times a week, for ten weeks scored significantly higher on a 9-minute run than sixth grade girls.

Sixth grade girls who participated in a ten week physical activity program thirty minutes a day, three times a week, for ten weeks scored significantly higher on the sit and reach post-test.

Sixth grade girls in a control group without a structured physical activity program scored significantly higher than control boys on the sit and reach post-test.

Sixth grade boys and girls who did not participate in a structured physical education program did not change significantly in



cardio-respiratory function, body composition or abdominal strength and endurance.

#### RECOMMENDATIONS FOR FURTHER STUDY

On the basis of the results of this study, the following questions were posed for further investigation. What are the effects of a ten week physical activity program on the heart rates in sixth grade students? Would running programs that measure the intensity of heart rates make changes in body composition over ten weeks time? What are the effects of a physical activity program lasting six weeks or twenty weeks? What are the effects of swimming instead of running on cardiovascular endurance, body composition, and flexibility? What are the effects of a ten week physical activity program on younger or older students? What are the effects of a ten week physical activity program done 50 minutes, twice a week? What are effects of a ten week physical activity program done thirty minutes, twice a week? What are the effects of a ten week physical activity program on the self-concept of sixth grade students? What are the effects of a ten week physical activity program on the attitudes of sixth grade students toward physical activity?

Other recommendations concerning the testing would be suggested by the researcher. Because of time and convenience, students counted sit-ups and laps. Unless the researcher tested each student individually, sit-ups not done properly might have been counted. Even then, it would be the researcher's subjective discretion.

The sit-up test for this test could be changed in the researcher's opinion. It is recommended hands be placed behind the head in the intermediate grades. This position would eliminate question about whether the sit-up was being done correctly and whether to count it. Even after demonstration and instructions, some students could do more sit-ups if done incorrectly. It would also be recommended that if testing were being done on each student in the entire school, parents and teachers be contacted to help count laps and sit-ups, particularly in the primary grades.

## REFERENCES

## REFERENCES

1. AAHPERD Health Related Physical Fitness Test Manual. American Alliance for Health, Physical Education, Recreation and Dance, 1900 Association Drive, Reston, VA.
2. Beaulieu, John E. "Developing a Stretching Program." The Physician and Sportmedicine, 9 (11): 59-64, 1981.
3. Boyer, J. L. "Coronary heart disease as a pediatric problem." American Journal of Cardiology, 33: 784-786, 1974.
4. Conrad, C. Carson. The Revitalization of Physical Fitness in the United States, U.S., Educational Resources Information Center, ERIC Document ED 148 798, 1978.
5. Corbin, Charles B. and others. Concepts in Physical Education, Iowa: Wm. C. Brown Company Publishers, 1981.
6. Corbin, Charles B. and Phillip Fletcher. "Diet and Activity Patterns of Obese and Non-Obese Elementary School Children." Research Quarterly, 39 (4): 922. December 1968.
7. Cooper, Kenneth H., and others. "An Aerobics Conditioning Program for the Fort Worth, Texas School District." Research Quarterly, 46: 435-450. October 1975.
8. Dauer, Victor P., and Robert P. Pangrazi. Dynamic Physical Education for Elementary School Children. Minnesota: Burgess Publishing Company, 1979.
9. deVries, Herbert A., Physiology of Exercises for Physical Education and Athletics. Iowa: Wm. C. Brown Company Publisher, 1980.
10. Falls, Harold B., and Ann M. Baylor, and Rod K. Dishman. Essentials of Fitness. Philadelphia: Saunders College, 1980.
11. Flint, M. M. "Effect of Increasing Back and Abdominal Muscle Strength on Low Back Pain." Research Quarterly, 29: 160, 1958.
12. Fluegelman, Andrew, Editor. The New Games Book. New York: A Headlands Press Book, Doubleday and Company, Inc., 1976.
13. Fox, Edward L. and Donald K. Mathews. The Physiological Basis of Physical Education and Athletics. Philadelphia: Saunders College, 1981.

14. Gilliam, Thomas B., and others. "The Prevalence of Coronary Heart Disease Risk Factors in Boys 8-12 Years of Age." Medicine and Science in Sport, 9 (1): 21-25.
15. Gilmore, C. P. and Editors of Time-Life Books, Exercising for Fitness. Virginia: Library of Health Time-Life Books, 1981.
16. Green, Leon. The Sunflower Cardio-pulmonary Research Project of Children, U.S., Educational Resources Information Center, ERIC Document ED 189 040, 1980.
17. Johnson, Mary L., Bertha S. Burke, and Jean Mayer. "The Prevalence and Incidence of Obesity in a Cross Section of Elementary and Secondary School Children." American Journal of Clinical Nutrition, 4 (3): 231, May/June 1956.
18. Kannel, W.B., and T. Dawber. "Atherosclerosis as a pediatric problem." The Journal of Pediatrics, 80: 544-554, 1972.
19. Mayer, Jean. "The Obese Child." Today's Education, 37-40, 1974.
20. Physical Education Newsletter, The University of Michigan. "Heart Health Project for Children." 6 (1): 1, 4.
21. Roscoe, John T. The Funstat Package in Fortran IV. Holt, Rinehart, and Winston, Inc., 1973.
22. Saltin, B., and G. Grimby. "Physiological Analysis of Middle-Aged and Old Former Athletes, Comparison with Still Active Athletes of the Same Ages." Circulation, 38 (6): 1104, 1968.
23. Stewart, Kerry J., and Bernard Gutin. "Effects of Physical Training on Cardio-respiratory Fitness in Children." Research Quarterly, 47 (1): 110-119, 1976.
24. Stull, G. Alan, and Thomas K. Cureton. Encyclopedia of Physical Education, Fitness and Sports Training, Environment, Nutrition and Fitness. AAHPERD Brighton Publishing Company, Inc., 1980.
25. Way, Joyce W. "Project Superheart an Evaluation of a Heart Disease Intervention Program for Children." Journal of School Health. January: 16-19, 1981.

APPENDIX A

Tables



Table 9

t-table of Pre-Test for 9-Minute Run for  
Experimental and Control Groups

Source	df	Mean	Standard Deviation	<u>t</u>
Experimental	36	1476.350	265.390	-0.404*
Control	36	1513.278	297.845	

\*not significant

Table 10

t-table of Pre-Test for 9-Minute Run  
for Control Boys and Girls

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	16	1598.625	418.181	1.094*
Girls	16	1445.000	141.082	

\*not significant

Table 11

t-table of Post-Test of 9-Minute Run for  
Control Boys and Girls

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	16	1503.625	186.143	0.637*
Girls	16	1454.600	141.151	

\* not significant

Table 12

Analysis of Variance for 9-Minute Run  
for Experimental Group

Source	df	Sums of Square	Mean Square	f
Between	1	246176.0000	246176.0000	3.6989*
Within	38	2529056.0000	66554.0625	
Total	39	2775232.0000		

\*not significant

Table 13  
 Analysis of Variance for 9-Minute Run  
 of Control Group

Source	df	Sums of Square	Mean Square	f
Between	1	12240.0000	12240.0000	0.2144*
Within	38	1940608.0000	57076.7031	
Total	39	1952848.0000		

\*not significant

Table 14  
t-table of Pre-Test Body Composition for  
 Experimental and Control Groups

Source	df	Mean	Standard Deviation	<u>t</u>
Experimental	36	23.350	9.060	0.539*
Control	36	21.750	9.233	

\*not significant

Table 15

t-table of Post-Test Body Composition for  
Experimental and Control Groups

Source	df	Mean	Standard Deviation	<u>t</u>
Experimental	36	22.500	7.623	-0.754*
Control	36	24.611	9.602	

\*not significant

Table 16

t-table of Pre-Test Body Composition for  
Experimental Group

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	18	22.607	9.485	-0.550*
Girls	18	25.083	8.535	

\*not significant

Table 17

t-table of Post-Test Body Composition  
for Experimental Group

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	18	22,250	8,537	-0.218*
Girls	18	23,083	5,545	

\*not significant

Table 18

t-table of Pre-Test Body Composition  
for Control Group

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	16	19.875	8.074	-0.761*
Girls	16	23.250	10,231	

\*not significant

Table 19  
t-table of Post-Test Body Composition for  
 Control Group

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	16	22,188	6.262	-0,955*
Girls	16	26,550	11,587	

\*not significant

Table 20  
 Analysis of Variance for Body Composition  
 for Experimental Group

Source	df	Sums of Square	Mean Square	f
Between	1	7.2266	7.2266	0.1031*
Within	38	2663.5508	70.0934	
Total	39	2670.7773		

\*not significant



Table 21

t-table of Pre- Sit-Up Test  
for Experimental and Control

Source	df	Mean	Standard Deviation	<u>t</u>
Experimental	36	25,900	9,216	-1,654*
Control	36	31,056	10,003	

\*not significant

Table 22

t-table of Post- Sit-Up Test  
for Experimental and Control

Source	df	Mean	Standard Deviation	<u>t</u>
Experimental	36	34,800	8,043	1,534*
Control	36	31,278	5,788	

\*not significant

Table 23  
 Analysis of Variance for Body Composition  
 of Control Group

Source	df	Sums of Square	Mean Square	f
Between	1	72.2500	72,2500	0.8216*
Within	34	2989.7500	87,9338	
Total	35	3062.0000		

\*not significant

Table 24  
t-table of Post Sit-Up Test for  
 Experimental Boys and Girls

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	18	36.429	8.706	1,420*
Girls	18	31,000	4.899	

\*not significant

Table 25

t-table of Pre- Sit-Up Test for  
Control Boys and Girls

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	16	32,750	11.145	0.631*
Girls	16	29.700	9,370	

\*not significant

Table 26

t-table of Post- Sit-Up Test for  
Control Boys and Girls

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	16	31,875	6.266	0,382*
Girls	16	30.800	5,673	

\*not significant

Table 27

Analysis of Variance for Sit-Ups  
for Control Group

Source	df	Sums of Square	Mean Square	f
Between	1	0.414	0,4414	0.0066*
Within	34	2270.5586	66.7811	
Total	35	2171.0000		

\*not significant

Table 28

t-table of Post Sit and Reach Test  
for Experimental and Control Groups

Source	df	Mean	Standard Deviation	<u>t</u>
Experimental	36	23,750	7.552	-1,909*
Control	36	27.833	5.294	

\*not significant

Table 29

t-table of Pre- Sit and Reach Test  
for Experimental Boys and Girls

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	18	20.214	6.554	-1.004*
Girls	18	23.167	4.355	

\*not significant

Table 30

t-table of Pre- Sit and Reach Test for  
Control Boys and Girls

Source	df	Mean	Standard Deviation	<u>t</u>
Boys	16	24.625	1.923	-1.518*
Girls	16	27.900	5.820	

\*not significant

Table 31  
 Analysis of Variance for Sit and Reach Test  
 for Experimental Group

Source	df	Sums of Square	Mean Square	f
Between	1	70,2266	70,2266	1,5047*
Within	38	1773,5508	46,6724	
Total	39	1843,7773		

\*not significant

Table 32  
 Analysis of Variance of Sit and Reach Test  
 for Control Group

Source	df	Sums of Square	Mean Square	f
Between	1	17.3633	17.3633	0.6905*
Within	38	854.9453	25,1454	
Total	39	872.3086		

\*not significant



APPENDIX B

Letter to Parents

January 5, 1982

Dear Parents,

My name is Jane Barr and I am a graduate student in physical education at Emporia State University. I am planning to write my thesis on the effects of a ten-week physical fitness activity program on fitness variables of sixth grade students as measured by the AAHPERD Health Related Fitness Test. As part of this project I will be testing students as well as teaching this physical education course.

The students will be tested at the beginning of the program which will be mid-January. One group will participate in ten weeks of physical fitness activities beginning January 18th, three times a week, thirty minutes per session. This group will be the sixth grade students from Longfellow School. The other group, sixth grade students from Irving School, will not participate in the physical activity program. At the end of ten weeks, all students will be retested to measure any changes.

The AAHPERD (American Alliance of Health, Physical Education, Recreation and Dance) Health Related Fitness Test measures the following aspects of physical fitness: cardiovascular function, body composition, abdominal and low-back hamstring musculo-skeletal function. The tests to measure each of these areas are as follows: Twelve-minute run (cardiovascular function); Tricep and subscapular skinfolds (body composition); Timed modified sit-up test (abdominal strength and endurance); Sit and Reach test (lower-back and hamstring flexibility). Each of these areas tested has a direct relationship with health. Poor body composition is more commonly known as obesity. Weak abdominal and low-back hamstring musculo-skeletal function is known to be the cause of low-back pain and back problems.

Activities for the physical fitness activities program will be designed to improve fitness in these areas. Although the program is designed to focus on fitness activities and fitness concepts, the activities will promote motor skill development also.

The AAHPERD Health Related Fitness Test is a validated test. National norms have been established from results of over 10,000 children in the United States.

Data will be recorded on coded forms and reported in such a way that they cannot be associated with a specific individual. Only the investigator and appropriate school officials will have access to the data. The data may be used in the future for professional presentations and publications. You will be provided with a copy of your child's results.

David Leitch, M.D. has volunteered his time at no cost to come to the schools and screen all students participating in this study. This will be done prior to the testing. If your child has any known

family history of coronary heart disease, hypertension, or physical problem which might affect his/her participation in this program, please notify your school principal,

If you have any objections to or questions about your child's participation in this study, please contact Larry Stewart at Longfellow, Dennis Hippe at Irving School, or me, Jane Barr.

Sincerely,

Larry Stewart

Dennis Hippe

Jane Barr

APPENDIX C

Physical Examination Form

Physical Examination Form  
For Sixth Grade Fitness Program

Student's Name: \_\_\_\_\_

Date of Birth: \_\_\_\_\_  
Month
Day
Year

School: \_\_\_\_\_

Physician's Report

<u>Check if any abnormal history</u>	<u>Circle</u>
_____ Cardio-Vascular System	Any history of Allergy-Head injury-
_____ Respiratory	Unconsciousness-Bone-Joint disease-
_____ Gastrointestinal	Heart Disease-Hypertension-Kidney
_____ Genitourinary-Gynecologist	disease-Diabetes-Emotional Disturbance-
_____ Central Nervous System	Epilepsy-Glasses-Contacts-
_____ Musculo System	Any abnormal physical findings
_____ EENT (Eye, Ear, Nose & Throat)	_____
_____ Scoliosis (Remarks Below)	_____
_____	Explanation of any abnormality _____
_____	_____

Medicines \_\_\_\_\_

Shots - Tetanus Imm. (Date) \_\_\_\_\_

Height \_\_\_\_\_ Stripped Weight \_\_\_\_\_ Min. Rec. Wrestling Wgt. \_\_\_\_\_

Blood Pressure \_\_\_\_\_

I certify that on this date I have examined this student and find that he/she is physically able to participate in the Fitness Testing Program proposed by Jane Barr for the sixth grade students of Irving and Longfellow Schools.

\_\_\_\_\_, 1982  
Date

\_\_\_\_\_  
Signature of Examining Physician

## Parent or Guardian's Permit

I hereby give my consent for the above student to participate in the Fitness Tests and Physical Fitness Activity Program as outlined in the letter from Jane Barr dated January 5, 1982. I have read this letter and I understand the proposed tests and the fitness program. I further understand that the School District and its employees shall not be responsible for any problems affecting this student which may arise from the student's participation in this program.

\_\_\_\_\_, 1982  
Date

\_\_\_\_\_  
Signature of Parent or Guardian

APPENDIX D

Testing Procedures

## AAHPERD Health Related Physical Fitness Tests

### 1. 9-Minute Run

Purpose: The purpose of the distance runs is to measure maximal functional capacity and endurance of the cardio-respiratory system.

Test Description: Students are instructed to run as far as possible in nine minutes. The students begin on the signal, "ready, start." Participants continue to run until a whistle is blown at nine minutes. Walking is permitted, but the objective is to cover as much distance as possible during the nine minutes.

Equipment and Facilities: An area suitable for distance run tests as recommended by the AAHPERD Health Related Physical Fitness Test Manual of 20 yards X 7½ yards was used.

Scoring: The 9-minute run was scored to the nearest 10 yards.

### 2. Sum of Skinfold Fat

Purpose: The purpose is to evaluate the level of fatness in school age boys and girls.

Test Description: In a number of regions of the body, the subcutaneous adipose (fat) tissue may be lifted with the fingers to form a skinfold. The skinfold fat measure consists of a double layer of subcutaneous fat and skin the thickness of which may be measured with a skinfold fat caliper. Two skinfold fat sites (triceps and subscapular) have been chosen for this test because they are easily measured and are highly correlated with total body fat.

Equipment: The Lange (Cambridge Scientific Industries, MD) skinfold calipers were used to obtain these measures.

Scoring: The skinfold measurement is registered on the dial of the caliper. Each measurement should be taken three consecutive times with the recorded score being the median (middle) of the three scores.

### 3. Modified Sit-ups

Purpose: The purpose of the sit-up is to evaluate abdominal muscular strength and endurance.



Test Description: To assume the starting position, the student lies on his back with knees flexed, feet on the floor, with the heels between 12 and 18 inches from the buttocks. The arms are crossed on the chest with the hands on the opposite shoulders. The feet are held by partners to keep them in touch with the testing surface. The student, by tightening his abdominal muscles, curls to the sitting position. Arm contact with the chest must be maintained. The chin should remain tucked on the chest. The sit-up is completed when the elbows touch the thighs. To complete the sit-up the student returns to the down position until the midback makes contact with the testing surface.

The timer gives the signal "ready-go", and the sit-up performance is started on the "go". Performance is stopped on the word "stop". The number of correctly executed sit-ups performed in 60 seconds shall be the score. Rest between sit-ups is allowed, and the student should be aware of this before initiating the test. However, the objective is to perform as many correctly executed sit-ups as possible in the 60-second period.

Equipment and Facilities: Tape was used to mark the correct distance on floor. A stop watch or sweep second hand from a wristwatch or clock may be used for timing.

Scoring: Record the number of correctly executed sit-ups that are completed in sixty seconds.

#### 4. Sit and Reach

Purpose: The purpose of the sit and reach is to evaluate the flexibility of the low back and posterior thighs.

Test Description: To assume starting position, pupils remove their shoes and sit down at the test apparatus with their knees fully extended and the feet shoulder-width apart. The feet should be flat against the end board. The arms are extended forward with hands placed on top of each other to perform the test. The pupil reaches directly forward, palms down, along the measuring scale four times and holds the position of maximum reach on the fourth trial. The position of maximum reach must be held for one second.

Equipment: The test apparatus consists of a specially constructed box with a measuring scale where 23 cm is at the level of the feet.

Scoring: The score is the most distant point reached on the fourth trial measured to the nearest centimeter. The test administrator should remain close to the scale and note the most distant line touched by the fingertips of both hands. If the hands reach unevenly, the test should be readministered. The tester should place one hand on the subject's knees to ensure that they remain extended.

APPENDIX E

Physical Activities

PHYSICAL ACTIVITIES

<u>Week 1</u>	<u>Min.</u>	<u>M</u>	<u>W</u>	<u>F</u>
	3:30	Warm-up "Physical" 1. Neck Rolls Shoulder shrugs Inhale-exhale 2. Jumping Jacks-16 3. Run in place 4. Jumping Jacks-16 5. Run in place 6. Arm circles Fwd-5 Bwd-5 7. Trunk Twists-8 8. Sit-ups - Until music changes 9. Push-ups- Until music changes 10. Jumping Jacks-16 11. Side bends - 8 12. Kicks	Warm-up "Physical" Flexibility Stretch Parachute: Number exchange both underneath and around parachute 3-minute run- walk Warm-down Stretches	Repeat W except add balls with parachute
	3:25	Flexibility stretches 1. Hamstrings  2. Quadriceps  3. Back  4. Back & Hamstring  5. Abdomen & Chest  6. Groin  7. Hip and Thigh  8. Shoulders	"Silver Rain" 9. Lower Leg  10. Hamstrings  11. Quadriceps  12. Lower Leg  13. Hamstrings  14. Abdomen & Chest  15. Groin  16. Hip and Thigh	"Carried Away"
	4:50	Parachute Activities - "Electric Horseman" 1. Run R 2. Run L 3. Run R 4. Run L 5. Shake 5-R 6. Shake 5-L 7. Shake Both 8. Hop R 9. Hop L	10. Hop R 11. Hop L 12. Shake 5 R 13. Shake 5 L 14. Shake both 15. Slide R 16. Slide L 17. Slide R 18. Slide L	

- |                      |                      |
|----------------------|----------------------|
| 19. Mushroom         | 25. Hold High L-Walk |
| 20. Skip R           | 26. Run R            |
| 21. Skip L           | 27. Run L            |
| 22. Skip R           | 28. Run R, Run L     |
| 23. Skip L           | 29. Mushroom         |
| 24. Hold High R-Walk |                      |

<u>Week 2</u>	<u>Min.</u>	<u>M</u>	<u>W</u>	<u>F</u>
	3:30	Warm-up "Physical"	Repeat M	No school -
	3:25	Flexibility stretches	Add; Routine to	
	15:00	Jump Rope Routine	"Daybreak"	
		"Elvira" Basic Jumps		
		Partner Jumps		
	4:00	Progressive Run		
	3-4	Warm-down and stretch		
<u>Week 3</u>				
	7-9	Warm-up "Physical"	Repeat M	No school -
		Flexibility stretches	Add: "Elvira" routine	Snow Day
	14	Jump Rope Activities		
		with Long Rope		
	5	Progressive Run		
	2-4	Warm-down		
<u>Week 4</u>				
	7-9	Warm-up "Physical"	Warm-up	Repeat W
		Flexibility stretches	Flexibility stretch	
	14	Jump Rope Activities	Circuit	
		Partner and Long Rope		
	6	Progressive Run	Progressive Run	
	2-3	Warm-down stretches	Warm-down and	
			stretches	
<u>Week 5</u>				
	7-9	Warm-up "Physical"	Repeat M	Repeat W
		Flexibility stretches		
	14	Circuit	Crab Soccer	
	7	Progressive Run	Jump Rope Timed-	
	2-3	Warm-down	1 min.	
			Sit-ups-1 min.	
<u>Week 6</u>				
	7-9	Warm-up "Physical"	Repeat M	Repeat M & W
		Flexibility stretches		
	12	Pillo Polo		
		Jump Rope & Sit-ups -		
		1 minute		
	8	Progressive Run		
	2-3	Warm-down		

<u>Week 7</u>	<u>Min.</u>	<u>M</u>	<u>W</u>	<u>F</u>
	7-9	Warm-up "Physical" Flexibility stretches	Repeat M Add Cotton-eyed	Repeat W
	12	Troika - 2 Hora	Joe - Delete Hora	
	9	Progressive Run		
	2-3	Warm-down		
<u>Week 8</u>				
	7-9	Warm-up "Physical" Flexibility Stretches	Repeat M	Repeat M Add "Seven Jumps" for 5 min. and Yakety Sax 5 min.
	10	"Yakety Sax" Rhythmic Running		
	10	Progressive Run		
	2-3	Warm-down		
<u>Week 9</u>				
	7-9	Warm-up "Physical" Flexibility stretches	No school	Repeat M Substitute "The Blob" & 4-corners
	10-11	Scatter Dodgeball 4-ball soccer		
	11	Progressive Run		
	2-3	Warm-down		
<u>Week 10</u>				
	7-9	Warm-up "Physical" Flexibility stretches	Repeat M	No school Parent/Teacher conference
	9	Pillo-polo Jump Rope - Sit-ups	Parachute Activities	
	12	Progressive Run	Same	
	2-3	Warm-down		

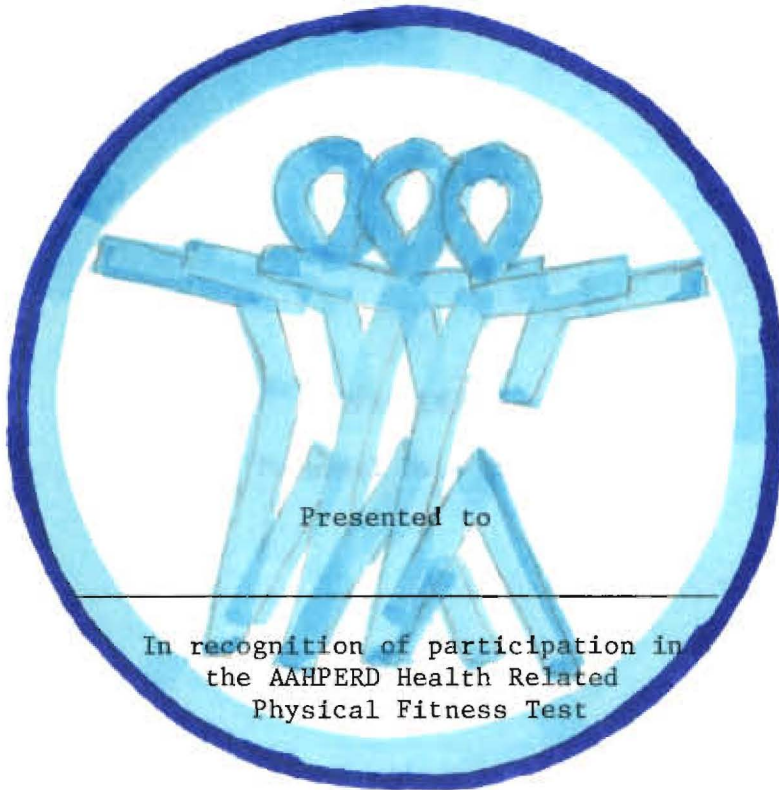
APPENDIX F

Participation Certificate

AMERICAN ALLIANCE FOR HEALTH, PHYSICAL EDUCATION, RECREATION AND DANCE

HEALTH RELATED PHYSICAL FITNESS

AWARD



"OPERATION PHYSICAL"

---

Date

---

Test Administrator

---

Principal

APPENDIX G

Personal Data Sheet



## AAHPERD HEALTH RELATED PHYSICAL FITNESS TEST

## PERSONAL DATA

	Trial 1	Trial 2
Age	_____	_____
Height	_____	_____
Weight	_____	_____

	Trial 1		Trial 2	
	Date _____	_____	Date _____	_____
	Score	Percentile	Score	Percentile
9-Minute Run	_____	_____	_____	_____
Body Composition	_____	_____	_____	_____
Sit-ups	_____	_____	_____	_____
Sit and Reach	_____	_____	_____	_____

Interpreting the Results:

9-Minute Run:	Above 50th	-	Desirable Level of Fitness
	50th	-	Minimum
	50th - 25th	-	Undesirable
	Below 25th	-	Very Low Level of Fitness
Body Composition:	Above 90th	-	Undesirable - too lean
	90th - 50th	-	Desirable amount of fatness & leanness good
	50th - 25th	-	Can maintain here but don't let fatness get higher
	Below 25th	-	Undesirable - Unhealthy
Sit-ups:	50th & Above	-	Desirable
	50th - 25th	-	Minimum Fitness Level
	Below 25th	-	Undesirable
Sit & Reach:	Above 50th	-	Desirable
	50th	-	Normal
	50th - 25th	-	Minimal Level
	Below 25th	-	Undesirable