

A COMPARATIVE STUDY OF THE USES IN BOYS PHYSICAL  
EDUCATION CLASSES OF THE EXER-GENIE AND  
CALISTHENICS FOR STRENGTH DEVELOPMENT

by

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B. S., Kansas State University, 1963

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A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Physical Education

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

1966

Approved by:

  
Major Professor

#### ACKNOWLEDGMENTS

The author is especially indebted to Mr. Raymond A. Wauthier, Assistant Professor of Physical Education, for his valuable guidance, professional advice, and his time and effort in the constructing of this report. Appreciation is also expressed to Professor T. M. Evans of the Physical Education Department of Kansas State University for his suggestions and criticisms of the manuscript. The author would like to thank Dr. J. Harvey Littrell of the College of Education, Kansas State University, for his professional advice with the statistics of the report. A final, special thanks is given to the fighting "Indian" boys of Manhattan High School who participated in the study.

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## I. THE PROBLEM

### Introduction

At the present time there is great emphasis being placed on weight training and weight training devices. This rapid increase has been caused, in part, by the recent emphasis on physical fitness. As a result of a considerable amount of research in this area, many physical educators have been led to assume that there are physical fitness and motor ability improvements to be derived from the use of weight training devices in physical education programs.

The Exer-Genie, is one of these devices mentioned above. This machine is a small (less than two pounds in weight) device which was devised to exercise muscles in the body for the purpose of both the strength and the flexibility of the muscle. After six years of research, the machine was placed on the market as an exerciser.

This investigator has had the opportunity to observe this machine on the athletic field and in the physical education classroom. This opportunity and a keen interest in its use has led to the present study.

### Statement of the Problem

The study was designed to see if it would be justifiable to replace regular calisthenics in boys physical education classes with an equal amount of time on the Exer-

Genie in order to develop strength. Five tests of strength were used as follows: pull-ups, right hand dynamometer, left hand dynamometer, back and leg dynamometer, and the back and arm dynamometer.

For this study endurance, muscle size, heart rate, flexibility, and body measurements were not tested.

#### Definition of Terms Used

Strength. The ability of a muscle to work against resistance depends on the amount of muscular force which can be exerted. This depends upon: (1) the size of the muscles; (2) the proportion of the constituent fibers engaged in the action; (3) the coordination of the muscle groups; (4) the physical condition of the muscles; and (5) the mechanical advantage of the levers employed.<sup>1</sup>

Isometric contraction. There is said to be an isometric contraction when the length of the muscle does not change. At the start of an isometric contraction there is a short movement of the muscle; however, this small movement is accepted as there is no movement of the skeletal part of the body.

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<sup>1</sup>Laurence E. Morehouse and Augustus T. Miller, Physiology of Exercise (St. Louis: The C. V. Mosby Company, 1953), p. 209.

Isotonic contraction. When the muscle shortens and the load remains the same, this action is known as an isotonic contraction.

Exer-Genie. This device consists of an engineered cylinder and a nylon rope that can be pulled back and forth through the cylinder with equal resistance in either direction. A quick adjustment permits the user to place up to 400 pounds of friction upon the rope as it passes through the cylinder. The device combines isometrics (exercise without motion) with isotonic (exercise with motion). The Exer-Genie is advertised as combining the latest theories in resistive exercises; that is by starting each exercise isometrically, it is claimed the subject obtains strength benefits, and by combining these exercises with isotonic movement the subject derives the further benefits of endurance and flexibility.

#### Scope of the Study

One hundred eighty-seven Manhattan High School male physical education students participated as subjects in this investigation. The boys came from six regular physical education classes. The group was divided according to the hour and the instructor. The boys in three classes comprised the group that maintained their regular calisthenic schedule. The subjects in three other classes used the Exer-Genies.

However, the results of only 140 boys were used in the final analysis because of excessive absences, class change, and illness at test time. Of the Exer-Genie group 91 started and 70 finished. All twenty-one of these fell in the category mentioned above. The calisthenic group started with 96 and finished with 70. Seven of this last group were cut due to class change and absences, while 19 were taken at random (numbers drawn from a box) to equal the number of seventy Exer-Genie subjects.

The subjects were sophomores, juniors, and seniors, with the majority coming from the sophomore class. They met at regular class time with ten minutes used for calisthenics and equal time to Exer-Genie. Both groups met every day for a five day week. The study ran for 41 days. The first tests were given January 26, 27, 28. The classes started their work January 31, 1966. The classes stopped their work March 28, 1966. The second tests were given March 29, 30, 31.

At the beginning of the program each subject was given the same strength tests. These tests were the pull-up, right hand dynamometer, left hand dynamometer, back and leg dynamometer, and back and arm dynamometer. These same tests were given at the end of the study to evaluate the effects of the Exer-Genie and the calisthenics on the subjects who participated.

### Equipment

The equipment used in this study included:

1. Thirteen Exer-Genies with the standard cylinder (range one ounce to four hundred pounds). Twenty-six straight bar handles and 13 regulation floor boards (with hook).
2. One wall clock (with second hand).
3. Exer-Genie storage box.
4. Hand Dynamometer-Narragansett Machine Co. Providence, R.I., U.S.A. Poundage 0-20-40-60-80-100-120-140-160-180-200.
5. Back and Leg Dynamometer-T. A. Upham, Boston, U.S.A. (856) 0-100-200-300-400-500 (Kilo).
6. One high bar--used as a chin bar.

### Limitations of Study

1. It was impossible to control the outside exercise of the subjects, therefore, it was necessarily assumed that the subjects' outside activity did not materially affect the study.

2. It would be difficult to determine the effects of motivation on each individual's scores, therefore, it was assumed that the subjects gave forth maximum effort during both testing situations and training sessions.

3. No attempt was made to determine whether gains or losses between the initial and final tests for either the Exer-Genie group or the calisthenics group were statistically significant differences.



## II. REVIEW OF RELATED LITERATURE

In conducting this study this investigator found it difficult to find related literature on the Exer-Genie. The copyright, patent pending and registered trademark of Exer-Genie, Inc. were dated 1964. The machine is relatively new to the field of physical education.

In a research newsletter from Dr. Dean D. Miller, physical fitness consultant to the Human Performance Laboratory of Lockheed Aircraft, and developer of the Exer-Genie, this investigator found a great deal of research related to flexibility, endurance, heart beat strength and increase and decrease of body measurements. Nothing was mentioned concerning strength.

This investigator in talking with Dr. Dean D. Miller, at the Central District American Association Health Physical Education and Recreation Convention held in Topeka, Kansas, April 1, 1966, was informed by Dr. Miller that a number of research projects were now in process, but at this time no publications had been released.

## III. METHODS AND PROCEDURES

### Description of the Training Program

The training started January 31, 1966, and continued until March 28, 1966. Prior to this training period, the

initial tests were given and the author attempted to motivate the subjects by demonstrating and giving an orientation to the subjects concerning the Exer-Genie. Points covered in the orientation were as follows: purpose of the testing program, facts about the Exer-Genie and its use in space, demonstration of dynamometers to be used, explanation of the terms isometric and isotonic contractions, how and why they were divided, and a challenge for them to do their best.

During the training period, all six classes were engaged in basketball, gymnastics, and tumbling. The first ten minutes of each class session was used for the exercises.

The basic exercise used by the Exer-Genie group was The Big Four. This exercise was repeated two times by each subject. The subjects were divided into groups according to the size of class. The classes ranged from 18 to 54 subjects. In the small classes the subjects were grouped in pairs; however, in the larger classes, groups of four and five were used since there were only thirteen Exer-Genies available.

A description of The Big Four exercise is as follows:

Setting the dial. The Exer-Genie has a calibrated dial which designates the amount of resistance set on the

machine. To set the resistance, grasp the metal loop with one hand, with the other hand grasp calibrated casing so that fleshy part of the thumb can push in the bullet pin. While thumb is depressing bullet pin, move calibrated casing toward metal loop so that bullet pin will not engage and casing will turn freely to desired resistance. Move calibrated casing away from loop, allowing pin to emerge completely, at selected setting. To increase resistance, always turn calibrated casing so that bullet pin revolves towards larger hole numbers. To decrease back to original "O" setting, always turn calibrated casing so that bullet pin revolves towards smaller hole numbers. Bullet pin must emerge directly above desired resistance in pounds pull. Set the machine for maximum curl poundage.

The base board. The Big Four exercise is started by placing the end of the cylinder to a hook fastened in the center of a 9 x 14 inch board. The hook is a stationary swivel support fastened by four screws to the center of the board.

Position of the board. Upon securing the cylinder to the center of the board, the subject stands on the board, with the cylinder and the hook between his feet. The gravitational pull of the subjects weight will keep the board on the floor and enable the subject to pull against a

secure resistance.

Proper stance. The subject takes his position on the board as mentioned above. He grasps the handle of the Exer-Genie with a reverse grip. He then takes the trailing rope and places it between fourth and fifth fingers and applies pressure with these two fingers. His legs are bent to a three-quarter squat, his back is straight, arms away from the legs, feet form a good base on the base board and the head is up with the eyes forward.

Beginning the exercise. Set control resistance with finger around trailing rope and set muscles of the entire body and hold isometrically for ten seconds. At the end of the ten-second period release trailing rope and straighten legs duplicating the dead lift. At this phase of the exercise the hands are up level with the elbows. From this position continue the upward movement of the arms completing the forearm curl. With the hands now under the chin reverse the grip, hands on top of the handle, and push upward over the head to a maximum reach. When a maximum reach has been attained, push upward onto the toes, bring your heels off the board. This completes the exercise and the trailing rope and handle are now in the starting position for the next subject to step onto the board and continue with a new exercise.

The second group, known as the calisthenic group, continued their regular calisthenics for their warm up at the beginning of every class period. The calisthenics lasted approximately ten minutes each day. The calisthenics were as follows: side strides, push-ups, set-ups, leg lifts, leg stretches, inverted push-ups, and toe touch. The calisthenic group did twenty-five of each of the seven per day.

A description of the seven calisthenics used are as follows:

Side strides. This exercise is commonly known as "jumping jacks". In the starting position, the arms are at the side and the feet are together. On the command to begin, the arms are lifted above the head as far as possible while the feet are moved outward shoulder length apart. When the hands touch and the feet are shoulder length apart, they are immediately returned to the starting position in the same manner as they were moved before. They were counted in the following manner: 1, 2, 3, 1 - 1, 2, 3, 2 - 1, 2, 3, 3 etc.

Push-ups. On the starting command, the subjects lifted to a push-up position. This position is taken when the subject is face downward on the floor with the arms extended and the body resting on the palms of the hands and

the toes of the feet. One push-up is completed when the subject bends his arms and touches his nose to the floor and returns to the normal push-up position. During the push-up, the back is straight and the arms are fully extended.

Sit-ups. The sit-ups are started while the subject is lying on his back with his feet together and his arms are placed behind his head with his fingers interlocking. On the command to start the exercise, the elbows are brought forward and touch the knees of the extended legs. On the command "down", the head is lowered back to the starting position.

Leg lifts. In the leg lift position, the subjects start sitting on the floor. The hands are placed behind the back on the floor approximately eight inches shoulder width apart. The leg lifts are a four count movement. On the count "one", the legs are lifted together about six inches off the floor. On the count "two", the legs are spread as far as possible. On count "three", the legs are brought back together again. On count "four", the legs are gently let back to the floor. The leg lifts are counted as are the side strides 1, 2, 3, 1 - 1, 2, 3, 2 - 1, 2, 3, 4 etc.

Leg stretchers. This exercise is sometimes called the Mountain Climber. The starting position is that of a track man's start. The hands are palms down on the floor shoulder width apart. The feet are staggered with the left leg forward and the right leg back. On the command to start, the right leg is bounced on for three counts and on the fourth count the left and right legs change positions. The counting of this exercise is the same as for the leg lifts.

Inverted push-ups. This exercise is started in an inverted or a bridged position. The position is taken from lying on the back and arching the back and pushing upward with the hands and the feet. When a maximum arch is reached, the count begins. The subject goes downward and touches his head to the floor and pushes his body back up into the arched position again to complete the exercise.

Wind mill. This exercise is commonly called the "toe toucher". The starting position is taken with the feet as far apart as possible. The arms are started in a parallel position from the floor, extended from the body. This is a four count movement. On the count of "one", the right hand touched the left toe. On the count of "two", the right hand comes back to starting position. On the count of "three", the left hand touches the right toe. On

the count of "four", the left hand comes back to the starting position.

### Testing Procedures

Five basic tests were used in testing the Manhattan High School physical education classes. The initial tests were given January 26, 27, and 28, 1966. The training program started January 31, 1966, and the final testing was done March 29, 30, and 31, 1966. This gave a training period of 41 school days.

The tests used were given by the two boys physical education instructors. The instructors recorded the same test throughout the testing procedure. This was to assure accurate readings from the test.

Adequate rest was given to each of the subjects between tests. A three day testing program helped to provide time for rest. Two recording sheets were prepared with each students name, with room for recording his individual test scores. An initial test form and a final test form were labeled and used to keep the scores separate.

Each subject was given two chances on each of the tests. The best score of the two was used as his score. This was done on the initial test and also on the final test. The five tests were as follows: pull-ups, left hand dynamometer, right hand dynamometer, back and leg dynamometer, and back and arm dynamometer. The data obtained



from the administration of these tests are found in the Appendix.

A description of the tests are as follows:

Pull-ups. A horizontal high bar was used for this test. The subject was required to start from a dead hang position. A subject was stationed under the bar to keep the subject on the bar from swinging or kicking. There was no jerking, swinging, or kicking during the test. The subjects chin must go completely over the bar so that light could be seen between the bar and the chin. Only complete pull-ups were counted. All subjects were required to use reverse grip. They were instructed to breath in going up and out coming down.

Left hand dynamometer. The dynamometer used for this test was manufactured by Narragansett Machine Co., Providence, R. I., U. S. A. The dial was calibrated in pounds with 20 lbs. per interval. The range of the dynamometer was 0-200 pounds. The test was given by placing the dynamometer in the left hand with the dial inward. This was done to keep the fingers from touching the dial and altering the reading. With the dial inward, the subject was asked to squeeze as tight as possible. The arm could use any range of motion but was not allowed to touch the body at any time. When the contraction of the left

hand was concluded, the subject rolled the dynamometer over, and the instructor recorded the score. The right hand was then tested and recorded and then the left hand a second time.

Right hand dynamometer. The same dynamometer mentioned above was used for the right hand. The same procedure was used.

Back and leg dynamometer. The back and leg dynamometer used for this test was manufactured by T. A. Upham, Boston, U. S. A. The measurement was in kilo-grams. The range was from 0-500 kilo-grams. The test was given with the subject standing on the dynamometer with legs bent at a forty-five degree angle. A cardboard cutout was made and placed behind the knee so that an angle of forty-five degrees was formed by the leg. The adjustable chain on the dynamometer allowed the adjustment to be made. A reverse grip was used and the arms were not allowed to touch the body or the legs at any time. The head was up and the bar held at knee level. Two tries were given each subject and the best recorded.

Back and arm dynamometer. The same dynamometer used for the back and legs was used for this test. A few simple changes were made to get maximum strength from the arms and

back. The grip used was a regular grip, with the palms on top of the bar. The legs were kept straight and the arms were straight. The bar was placed at knee level. The subjects were asked to pull straight up from the center of the dynamometer. Two tries were given to each subject and the best score was recorded.

#### IV. RESULTS AND DISCUSSION

Several null hypotheses were tested to determine whether or not there were statistically significant differences in the performances of the Exer-Genie and calisthenics groups prior to and upon completion of the experiment. Since there were five strength tests, then ten null hypotheses were tested.

Hypothesis one. There is no significant difference between the means of the initial scores on the Pull-up test for those who used the Exer-Genie and those who did the calisthenics. From Table I it can be determined that this null hypothesis was accepted; therefore, there was no statistically significant difference between the two groups on the initial pull-up test.

TABLE I  
 STATISTICAL DATA DERIVED FROM THE INITIAL PULL-UP  
 TEST FOR THE EXER-GENIE AND  
 CALISTHENICS GROUPS

Statistics	Exer-Genie group	Calisthenics group
Mean	8.32	9.10
S.D.	4.77	4.17
S.D. mean	.571	.500
S.D. difference between mean	.76	
t	1.03	

Not significant at the one per cent level.

Hypothesis two. There is no significant difference between the means of the final scores on the pull-up test for those who used the Exer-Genie and those who did the calisthenics. From Table II it can be determined that this null hypothesis was accepted; therefore, there was no statistically significant difference between the two groups on the final pull-up test given at the conclusion of the experiment.

TABLE II

STATISTICAL DATA DERIVED FROM THE FINAL FULL-UP  
TEST FOR THE EXER-GENIE AND CALISTHENICS GROUPS

Statistics	Exer-Genie group	Calisthenics group
Mean	11.16	12.19
S.D.	5.19	4.89
S.D. mean	.625	.588
S.D. difference between mean	1.03	
t	1.20	

Not significant at the one per cent level.

Hypothesis three. There is no significant difference between the means of the initial scores on the right hand dynamometer test for those who used the Exer-Genie and those who did the calisthenics. From Table III it can be determined that this null hypothesis was accepted; therefore, there was no statistically significant difference between the two groups on the initial right hand dynamometer test.

TABLE III

STATISTICAL DATA DERIVED FROM THE INITIAL RIGHT HAND  
DYNAMOMETER TEST FOR THE EXER-GENIE AND  
CALISTHENICS GROUPS

Statistics	Exer-Genie group	Calisthenics group
Mean	108.93	103.50
S.D.	19.5	18.8
S.D. mean	2.34	2.250
S.D. difference between mean	3.25	
	t	1.67

Not significant at the one per cent level.

Hypothesis four. There is no significant difference between the means of the final scores on the right hand dynamometer test for those who used the Exer-Genie and those who did the calisthenics. From Table IV it can be determined that this null hypothesis was accepted; therefore, there was no statistically significant difference between the two groups on the final right hand dynamometer test given at the conclusion of the experiment.

TABLE IV

STATISTICAL DATA DERIVED FROM THE FINAL RIGHT HAND  
DYNAMOMETER FOR THE EXER-GENIE AND  
CALISTHENICS GROUPS

Statistics	Exer-Genie group	Calisthenics group
Mean	109.07	109.07
S.D.	20.8	18.6
S.D. mean	2.50	2.238
S.D. difference between mean	3.35	
t	0.00	

Not significant at the one per cent level.

Hypothesis five. There is no significant difference between the means of the initial scores on the left hand dynamometer test for those who used the Exer-Genie and those who did the calisthenics. From Table V it can be determined that this null hypothesis was accepted; therefore, there was no statistically significant difference between the two groups on the initial left hand dynamometer test.

TABLE V

STATISTICAL DATA DERIVED FROM THE INITIAL LEFT HAND  
DYNAMOMETER TEST FOR THE EXER-GENIE AND  
CALISTHENICS GROUPS

Statistics	Exer-Genie group	Calisthenics group
Mean	100.64	95.07
S.D.	17.1	18.5
S.D. mean	2.06	2.226
S.D. difference between mean	3.03	
t	1.84	

Not significant at the one per cent level.

Hypothesis six. There is no significant difference between the means of the final scores on the left hand dynamometer test for those who used the Exer-Genie and those who did the calisthenics. From Table VI it can be determined that this null hypothesis was accepted; therefore, there was no statistically significant difference between the two groups on the final left hand dynamometer test given at the conclusion of the experiment.



TABLE VI  
 STATISTICAL DATA DERIVED FROM THE FINAL LEFT HAND  
 DYNAMOMETER FOR THE EXER-GENIE AND  
 CALISTHENICS GROUPS

Statistics	Exer-Genie group	Calisthenics group
Mean	103.50	98.93
S.D.	17.8	16.8
S.D. mean	2.14	2.021
S.D. difference between mean	2.94	
t	1.55	

Not significant at the one per cent level.

Hypothesis seven. There is no significant difference between the means of the initial scores on the back and leg dynamometer test for those who used the Exer-Genie and those who did the calisthenics. From Table VII it can be determined that this null hypothesis was accepted; therefore, there was no statistically significant difference between the two groups on the initial back and leg dynamometer test.

TABLE VII

STATISTICAL DATA DERIVED FROM THE INITIAL BACK AND LEG  
DYNAMOMETER TEST FOR THE EXER-GENIE AND  
CALISTHENICS GROUPS

Statistics	Exer-Genie group	Calisthenics group
Mean	136.50	132.93
S.D.	28.5	27.4
S.D. mean	3.43	3.307
S.D. difference between mean	4.76	
t	.75	

Not significant at the one per cent level.

Hypothesis eight. There is no significant difference between the means of the final scores on the back and leg dynamometer test for those who used the Exer-Genie and those who did the calisthenics. From Table VIII it can be determined that this null hypothesis was accepted; therefore, there was no statistically significant difference between the two groups on the final back and leg dynamometer test given at the conclusion of the experiment.

TABLE VIII

STATISTICAL DATA DERIVED FROM THE FINAL BACK AND LEG  
DYNAMOMETER FOR THE EXER-GENIE AND  
CALISTHENICS GROUPS

Statistics	Exer-Genie group	Calisthenic group
Mean	139.07	139.36
S.D.	26.1	25.2
S.D. mean	3.29	3.032
S.D. difference between mean	4.36	
t	.07	

Not significant at the one per cent level.

Hypothesis nine. There is no significant difference between the means of the initial scores on the back and arm dynamometer test for those who used the Exer-Genie and those who did the calisthenics. From Table IX it can be determined that this null hypothesis was accepted; therefore, there was no statistically significant difference between the two groups on the initial back and arm dynamometer test.

TABLE IX

STATISTICAL DATA DERIVED FROM THE INITIAL BACK AND ARM  
DYNAMOMETER TEST FOR THE EXER-GENIE AND  
CALISTHENICS GROUPS

Statistics	Exer-Genie group	Calisthenics group
Mean	127.93	132.50
S.D.	25.3	23.4
S.D. mean	3.04	2.815
S.D. difference between mean	4.14	
t	1.10	

Not significant at the one per cent level.

Hypothesis ten. There is no significant difference between the means of the final scores on the back and arm dynamometer test for those who used the Exer-Genie and those who did the calisthenics. From Table X it can be determined that this null hypothesis was accepted; therefore, there was no statistically significant difference between the two groups on the final back and arm dynamometer test given at the conclusion of the experiment.

TABLE X  
 STATISTICAL DATA DERIVED FROM THE FINAL BACK AND ARM  
 DYNAMOMETER FOR THE EXER-GENIE AND  
 CALISTHENICS GROUP

Statistics	Exer-Genie group	Calisthenic group
Mean	134.93	139.07
S.D.	25.6	25.1
S.D. mean	3.08	3.020
S.D. difference between mean	4.13	
t	.96	

Not significant at the one per cent level.

#### V. SUMMARY AND CONCLUSIONS

##### Summary

The present study was designed to evaluate the contributions of the Exer-Genie machine to physical strength. The information gained would be used to determine whether or not it would be justifiable to replace regular calisthenics, done in boys physical education classes, with an equal amount of time being spent on the Exer-Genie.

To achieve these objectives, 140 subjects participated in a 41 day training program which met five days a week for one hour. The program consisted of the two groups working on strength. One group called the Exer-Genie group used the Exer-Genie machine every day for ten

minutes at the beginning of the class period. The other group, called the Calisthenic group, did their regular calisthenics, side strides, push-ups, sit-ups, leg lifts, leg stretch, inverted push-ups and wind mills, during the first ten minutes of their class.

Before starting the training period five strength tests were given each of the groups. The five tests were as follows: pull-up, right hand dynamometer, left hand dynamometer, back and leg dynamometer and back and arm dynamometer. The same test was given at the conclusion of the training period.

The data consisted of records of performances on the strength test. Statistical treatment of the data was made to calculate means for the scores of the tests. The mean scores were then calculated to find the difference between mean scores and to determine whether there was a statistically significant difference between the means.

From the data collected by this study it was found that there were no statistically significant differences between the Exer-Genie and Calisthenics groups in their initial and final scores on the five tests of strength.

### Conclusion

The author feels it reasonable to conclude that for physical education class work the Exer-Genie and the

calisthenics offer the same strength results when conducted as specified in this study.

APPENDIX A

FREQUENCY TABLES USED IN THE STUDY



PULL-UPS  
EXER-GENIE GROUP

<u>Initial test</u>		<u>Final test</u>	
<u>No. of pull-ups</u>	<u>No. of students</u>	<u>No. of pull-ups</u>	<u>No. of students</u>
21 - 23	1	24 - 26	2
18 - 20	1	21 - 23	1
15 - 17	4	18 - 20	4
12 - 14	13	15 - 17	11
9 - 11	14	12 - 14	13
6 - 8	16	9 - 11	16
3 - 5	12	6 - 8	14
0 - 2	9	3 - 5	7
Mean 8.52		Mean 11.16	

PULL-UPS  
CALISTHENICS GROUP

<u>Initial test</u>		<u>Final test</u>	
<u>No. of pull-ups</u>	<u>No. of students</u>	<u>No. of pull-ups</u>	<u>No. of students</u>
		21 - 23	1
18 - 20	1	18 - 20	9
15 - 17	9	15 - 17	14
12 - 14	9	12 - 14	19
9 - 11	21	9 - 11	10
6 - 8	15	6 - 8	9
3 - 5	9	3 - 5	6
0 - 2	6	0 - 2	2
Mean 9.10		Mean 12.19	

LEFT HAND DYNAMOMETER  
EXER-GENIE GROUP

<u>Initial test</u>		<u>Final test</u>	
<u>Score in lbs.</u>	<u>No. of students</u>	<u>Score in lbs.</u>	<u>No. of students</u>
		150 - 159	1
140 - 149	1	140 - 149	0
130 - 139	3	130 - 139	6
120 - 129	6	120 - 129	6
110 - 119	13	110 - 119	10
100 - 109	14	100 - 109	15
90 - 99	13	90 - 99	19
80 - 89	10	80 - 89	16
70 - 79	9	70 - 79	3
60 - 69	0	60 - 69	2
50 - 59	1		
Mean 100.64		Mean 103.50	

LEFT HAND DYNAMOMETER  
CALISTHENICS GROUP

<u>Initial test</u>		<u>Final test</u>	
<u>Score in lbs.</u>	<u>No. of students</u>	<u>Score in lbs.</u>	<u>No. of students</u>
130 - 139	3	130 - 139	3
120 - 129	6	120 - 129	5
110 - 119	4	110 - 119	8
100 - 109	13	100 - 109	21
90 - 99	22	90 - 99	12
80 - 89	5	80 - 89	13
70 - 79	10	70 - 79	5
60 - 69	7	60 - 69	2
		50 - 59	1
Mean 95.07		Mean 98.93	

RIGHT HAND DYNAMOMETER  
EXER-GENIE GROUP

<u>Initial test</u>		<u>Final test</u>	
<u>Score in lbs.</u>	<u>No. of students</u>	<u>Score in lbs.</u>	<u>No. of students</u>
160 - 169	2	160 - 169	1
150 - 159	0	150 - 159	1
140 - 149	2	140 - 149	3
130 - 139	8	130 - 139	8
120 - 129	6	120 - 129	8
110 - 119	10	110 - 119	12
100 - 109	19	100 - 109	10
90 - 99	16	90 - 99	18
80 - 89	3	80 - 89	3
70 - 79	3	70 - 79	5
60 - 69	1	60 - 69	1
Mean 108.93		Mean 109.7	

RIGHT HAND DYNAMOMETER  
CALISTHENICS GROUP

<u>Initial test</u>		<u>Final test</u>	
<u>Score in lbs.</u>	<u>No. of students</u>	<u>Score in lbs.</u>	<u>No. of students</u>
		160 - 169	2
150 - 159	1	150 - 159	0
140 - 149	2	140 - 149	0
130 - 139	4	130 - 139	9
120 - 129	7	120 - 129	8
110 - 119	7	110 - 119	12
100 - 109	19	100 - 109	16
90 - 99	14	90 - 99	12
80 - 89	11	80 - 89	10
70 - 79	3	70 - 79	1
60 - 69	2		
Mean 103.50		Mean 109.07	

BACK AND LEG DYNAMOMETER  
EXER-GENIE GROUP

<u>Initial test</u>		<u>Final test</u>	
<u>Score in kilograms</u>	<u>No. of students</u>	<u>Score in kilograms</u>	<u>No. of students</u>
		220 - 229	1
		210 - 219	0
200 - 209	3	200 - 209	0
190 - 199	1	190 - 199	2
180 - 189	3	180 - 189	2
170 - 179	2	170 - 179	6
160 - 169	5	160 - 169	3
150 - 159	9	150 - 159	7
140 - 149	5	140 - 149	8
130 - 139	8	130 - 139	12
120 - 129	11	120 - 129	8
110 - 119	10	110 - 119	13
100 - 109	9	100 - 109	6
90 - 99	4	90 - 99	2
Mean 136.50		Mean 139.07	

BACK AND LEG DYNAMOMETER  
CALISTHENICS GROUP

<u>Initial test</u>		<u>Final test</u>	
<u>Score in kilograms</u>	<u>No. of students</u>	<u>Score in kilograms</u>	<u>No. of students</u>
		200 - 209	1
190 - 199	3	190 - 199	2
180 - 189	1	180 - 189	2
170 - 179	1	170 - 179	5
160 - 169	6	160 - 169	5
150 - 159	11	150 - 159	9
140 - 149	9	140 - 149	10
130 - 139	4	130 - 139	8
120 - 129	7	120 - 129	11
110 - 119	13	110 - 119	6
100 - 109	10	100 - 109	9
90 - 99	3	90 - 99	2
80 - 89	1		
70 - 79	0		
60 - 69	1		
Mean 132.93		Mean 139.36	



BACK AND ARM DYNAMOMETER  
EXER-GENIE GROUP

<u>Initial test</u>		<u>Final test</u>	
Score in kilograms	No. of students	Score in kilograms	No. of students
190 - 199	2	190 - 199	5
180 - 189	1	180 - 189	0
170 - 179	2	170 - 179	1
160 - 169	5	160 - 169	7
150 - 159	4	150 - 159	3
140 - 149	5	140 - 149	12
130 - 139	7	130 - 139	7
120 - 129	14	120 - 129	13
110 - 119	13	110 - 119	14
100 - 109	12	100 - 110	3
90 - 99	3	90 - 99	5
80 - 89	1		
70 - 79	1		
Mean 127.93		Mean 134.93	

BACK AND ARM DYNAMOMETER  
CALISTHENICS GROUP

<u>Initial test</u>		<u>Final test</u>	
<u>Score in kilograms</u>	<u>No. of students</u>	<u>Score in kilograms</u>	<u>No. of students</u>
		190 - 199	1
		180 - 189	2
170 - 179	5	170 - 179	6
160 - 169	5	160 - 169	7
150 - 159	9	150 - 159	9
140 - 149	9	140 - 149	11
130 - 139	5	130 - 139	7
120 - 129	19	120 - 129	10
110 - 119	5	110 - 119	7
100 - 109	7	100 - 109	8
90 - 99	4	90 - 99	1
80 - 89	2	80 - 89	0
		70 - 79	1
Mean 132.50		Mean 139.07	

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A COMPARATIVE STUDY OF THE USES IN BOYS PHYSICAL  
EDUCATION CLASSES OF THE EXER-GENIE AND  
CALISTHENICS FOR STRENGTH DEVELOPMENT

by

DAVID R. LAURIE, JR.

B. S., Kansas State University, 1963

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AN ABSTRACT OF A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Physical Education

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

1966

The study was designed to see if it would be justifiable to replace regular calisthenics in boys physical education classes with an equal amount of time on the Exer-Genie machine in order to develop strength. Five tests of strength were used as follows: pull-ups, right hand dynamometer, left hand dynamometer, back and leg dynamometer, and the back and arm dynamometer.

One hundred forty Manhattan High School male physical education students participated in this investigation. The classes were divided into two groups. Three classes were divided and placed in the Exer-Genie group and three classes were placed in the Calisthenic group. The Exer-Genie group worked on the Big Four exercise for ten minutes each day, while the Calisthenic group continued on their regular calisthenics for ten minutes each day. The calisthenics were as follows: side strides, push-ups, sit-ups, leg lifts, leg stretchers, inverted push-ups and wind mills. The training period ran for forty-one days. The subjects were given an initial test before the training period and a final test at the end of the investigation.

Several null hypotheses were tested to determine whether or not there were statistically significant differences in the performances of the Exer-Genie and calisthenics groups prior to and upon completion of the experiment. Since there were five strength tests, then ten

null hypotheses were tested. Statistical treatment of the data was made to calculate means for the scores of the tests. The difference between means scores, and the standard errors of the differences between means were determined. The test was used to determine whether there were statistically significant differences between the various means. From the data collected by this study it was found that there was no statistically significant differences between the Exer-Genie and Calisthenics groups in their initial and final scores on the five tests of strength.

The author feels it reasonable to conclude that for physical education class work the Exer-Genie and the calisthenics offer the same strength results when conducted as specified in this study.