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A Comparison of Methods of Administering Modified Pull-Ups for Girls

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A COMPARISON OF METHODS OF ADMINISTERING MODIFIED PULL-UPS FOR GIRLS

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TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

The modified pull-up for girls is found as an item in many physical fitness tests. This test is used to measure the arm and shoulder strength of girls. There is difficulty in administering the pull-ups because of the various heights of the girls being tested. Evidence throughout the years has shown that there are several different methods of administering the modified pull-up.

According to Clarke (4:154), A. E. Gay invented a device that greatly improved the administration of the girls' pull-up test.

It was the writer's intent to find a method of administering pull-ups for girls that would be as accurate as the Gay Apparatus, with less expense and less work for the administrator. To determine this, a correlation between the number of modified pull-ups achieved on the Gay Apparatus and the number of modified pull-ups on an experimental apparatus was tested. In addition, the Fisher t was computed to determine if the experimental apparatus was the same as or different from the Gay Apparatus.

I. THE PROBLEM

Statement of the problem. The purpose of this study was to find a method of administering pull-ups for girls that would be as accurate as the Gay Apparatus.

II. HYPOTHESIS

The following hypothesis has been formulated for the purpose of this study:

No significant correlation will exist between the number of pull-ups obtained on the Gay Apparatus and the number obtained on the experimental apparatus.

III. LIMITATIONS OF THE STUDY

The study was limited in the following ways:

1. Subjects were limited to one hundred Central Washington State College women enrolled in the service classes of basic skills and body conditioning.

2. Testing was done during three consecutive weeks of April, 1969.

3. Factors such as desire, motivation and attitude were not measured.

IV. DEFINITIONS OF TERMS USED

Experimental Apparatus. The experimental apparatus consisted of a wooden frame made of two by fours. It was ten feet long and thirty inches wide. Holes large enough to insert a sixteen penny nail were drilled two inches apart on the leading edge of the vertical two by fours. A metal bar was placed across the frame, resting on the nails at the desired height. The total cost of the experimental apparatus was four dollars.

Gay Apparatus. The Gay Apparatus is a device that consists of a platform with an adjustable heel rest, which may be raised or lowered depending upon the height of the girl being tested. The rings were attached on the horizontal bar and remained at a fixed height.

Modified Pull-up. The modified pull-up is done with the student's body forming a straight line and at an angle (varying from test to test) from the floor. The bar should be at chest level of the student. The student should grasp the bar with palms facing away from the body. The student alternately raises the body until the chest touches the bar, and then returns to a full hang position. One pull-up is scored each time the student completes a pull-up.

CHAPTER II

REVIEW OF LITERATURE

Upon reviewing the literature relevant to this study, the writer was able to find research dealing with various methods of administering the modified pull-up for girls. Evidence has shown that there are several different methods in the administering of the modified pull-up.

The testing of the modified pull-up in the A. A. H. P. E. R. Youth Fitness test (1:4-5) uses a metal or wooden bar approximately 1 1/2 inches in diameter and placed at a convenient height. A doorway gym bar adjusted at the desired height in a doorway works very well. The height of the bar should be adjusted to approximately the nipple level of the girl taking the test. The student should grasp the bar with palms facing away from the body with the body under the bar and arms fully extended. The legs and body should comprise a straight line and form an angle of 45 degrees with the floor; the feet should be anchored in such a position that when the pull-up is made the student's chest will touch the bar. The heels must be braced to prevent slipping. The student should alternately raise the body until the chest touches the bar on the pull-up and then straighten the arms

as the body is lowered. The student must keep the body straight throughout the exercise. One point is scored each time the student completes a pull-up.

Barrow (2:241-242) reported that in the New York State Physical Fitness Test a large mat and either a horizontal bar or ladder was used to test the modified pull-up. The bar should be adjusted to a height even with the bottom of the girl's breast bone. If a ladder is used it should be placed at a 45-degree angle. The girl should grasp the bar with the palms facing upward and slide the feet under the bar until the body and legs are completely extended with the arms now at an angle of 90 degrees with the chest. The legs and body should comprise a straight line and form an angle of approximately 45 degrees with the floor, with the weight of the body resting on the heels. To prevent slipping, the feet of the student should be braced by the scorer placing the foot sideways under the insteps. From this position, the girl pulls up with the arms until they are completely bent and the chest touches the bar or rung. The girl then returns to the starting position and repeats as many times as possible. One point is scored for each complete pull-up.

Scott and French (10:295-296) suggested the horizontal bar for the testing of the modified pull-up. Adjust the bar to the level of the xiphoid (angle between the ribs at the base of the sternum) when the subject stands erect. Grasp the bar with the hands about shoulder

width apart and palms toward the face. Move the feet far enough beyond the bar that when the weight rests on the heels, with knees, hips and back straight, the line of the body forms a right angle with the line of the straight arms. Keep the body straight and bend the arms until the neck and upper chest touches the bar. Extend arms again. Repeat without pausing and continue as long as possible or for a stated number of times. The score is the number which is completed before stopping or before the body begins to sag or sway.

McCloy (9:151) stated the modified pull-up test should have the horizontal bar or the rings adjusted to about the height of the bottom of the sternum. The subject is instructed to grasp the bar with the palms upward and to slide the feet under the bar until the legs and the trunk are completely extended and until the arms are thirty degrees from the chest. The weight of the body should rest on the heels. Keeping the trunk extended, the subject pulls the body upward to the bar or the rings as many times as possible.

It was also reported by Barrow (2:259) that the North Carolina Fitness Test used two chairs of equal height with a minimum height of thirty inches supporting a bar one inch in diameter and four feet long. A student sits in each chair and holds the bar on each chair to prevent it from sliding or rotating. The student should take a sitting position on the floor under the bar with the feet extended, grasping the bar with the palms of the hands turned away from the face, the arms

fully extended. The body is lifted by pulling with the arms until the chest or chin touches the bar and is then lowered to a full extension of the arms. The body must be kept straight at the knees and hips. The arms must be fully extended between pull-ups.

Another test using the modified pull-up is the Washington State Physical Fitness Test for Secondary School girls (11:19). Every three girls should have a wand, with a six-inch ribbon attached to the middle of the wand. The subject lies flat on her back on the floor. One student stands on either side in a forward lunge position, one facing in the direction of the subject's feet, the other in the direction of her head. The students hold the wand so that it is supported by their forward thighs at the point directly above the subject's shoulders at the height of full reach. The wand is held so that the ribbon hangs straight down. The subject grasps the wand with the hands using either grip, i.e. palms forward or palms back. Keeping a straight line from heels to head, the subject pulls upward until the chest touches the ribbon (ribbon moves), then returns to a reclining position. This constitutes one pull-up. The movement is repeated as many times as possible.

Mathews (8:117) indicated that the Division for Girls' and Women's Sports Fitness Test uses the modified pull-up to test the arm and shoulder strength of girls. In this test a horizontal bar or one arm of the parallel bars is placed 3 1/2 feet from the floor. The student

grasps the bar with both hands, palms upward, bends the arms and moves close to the bar and at the same time extends the legs under the bar until the body is in a straight line from knees to shoulders. The student extends the arms fully, bends the knees to a right angle, and keeps the feet on the floor. The body should not be in a straight line from shoulders to knees and parallel to the floor. The weight is supported by the hands and feet. From this starting position the student pulls up with the arms until the chest touches the bar. The body moves from the knees and the student must not bend at the hips, or hollow the back. The student returns to extended-arm position. This is repeated as many times as possible.

Clarke (4:153-154) described the modified pull-up used in the Rogers Physical Fitness Test Index. The rings should be loosely attached (in order to permit the hands to twist naturally as the subject performs the test) to either an adjustable horizontal bar or one bar of the parallel bars which may be conveniently raised and lowered. A mat should be used to prevent the feet from slipping. The rings should be adjusted to approximately the height of the apex of the sternum, thus requiring each girl to pull approximately the same proportion of the weight. The girl should grasp the rings with palms outward and should slide the feet under the bar until the body and arms form

approximately a right angle when the body is held straight. The weight should rest on the heels. The test is to pull-up (with the body held perfectly straight) as many times as possible.

According to Clarke (4:154), A. E. Gay perfected a device that greatly improved the procedure for administering the girls' pull-up test. This device consists of a platform with an adjustable heel rest which may be raised or lowered depending upon the height of the girl being tested. In a communication from A. E. Gay, he states that:

> We are familiar with the old method of conducting pull-up tests, with rings attached to the horizontal bar at a height of four feet from the floor (or mat). Girls who were short in stature and particularly those of four feet or less than five feet, placed their feet a very short distance in front of the vertical axis of the horizontal bar. The pull-up tests for such short persons was more a matter of rocking back and forth on the heels, merely flexing and extending the arms, and because of the high center of gravity and a short arch through which to pull the body weight, very little muscular effort was necessary. Yet, these short girls made a score very often of over one hundred pull-ups. On the other hand, girls from five to six feet tall, and particularly the taller girl, when in position for the tests, placed their feet a greater distance in front of the vertical axis of the horizontal bar. Consequently, these tall girls with a much lower center of gravity, exerted a greater amount of muscular energy in pulling their body weight through a longer arc, made fewer pull-ups and a lesser score (7).

The Gay Apparatus makes it possible to give a valid pull-up test to all girls who range from four to six feet in height. To use the Gay Apparatus the platform is placed on a five by ten mat under the horizontal bar. The horizontal bar is adjusted to a height of five feet

from the top of the platform, and the rings are hooked onto the horizontal bar so that each ring is in alignment with the corresponding height of the individual. The girl to be tested takes hold of the rings and places the feet, one at a time, on the heel rest, straightens the body, and begins the pull-ups. No body sagging is allowed. The chest must come up to the rings at each pull-up.

From the above descriptions, it can be seen that there are various ways of administering the modified pull-up. The Gay Apparatus has taken into consideration the difficulty in administering the pull-up because of the various heights of the girls being tested. It is the writer's intent to also take into consideration the height of the girls being tested when using the experimental apparatus.

CHAPTER III

PROCEDURES

The purpose of this study was to determine if there were a correlation between the number of modified pull-ups achieved on the Gay Apparatus and the number of modified pull-ups on the experimental apparatus. The group selected for this study was composed of one hundred Central Washington State College women enrolled spring quarter in the service classes of basic skills and body conditioning. Testing was conducted during three consecutive weeks of April, 1969. During this time the researcher tested four different groups of twenty-five women in each group. The four groups were tested on the Gay Apparatus and the experimental apparatus set at three different angles. Due to absences during the three weeks of testing, only ninety students' scores were computed on the experimental apparatus number one, and eighty-seven scores computed on the experimental apparatus number two and three. The groups were rotated to eliminate either fatigue or the gaining of strength.

All subjects were oriented as to the purpose of the test, told they would not be graded on the results, and encouraged to do their best at all times.

The Gay Apparatus platform was placed on a five-by-ten mat under the horizontal bar. The horizontal bar was adjusted to a height of five feet from the top of the platform. The rings were hooked to the horizontal bar. The height of the individual to be tested was determined, and the flanges of the heel rest placed in the adjuster notches corresponding to the height of the individual; i.e., for a girl sixty inches in height, the flanges were placed in the notches marked sixty inches. The girl to be tested took hold of the rings and placed the feet, one at a time, on the heel rest, straightened the body, and began the pull-up. The chest came up to the rings at each pull-up. One pull-up was scored each time the student completed a pull-up. (See Appendix, Figure 1, page 24.)

The first experimental test group used the apparatus set with one end of the apparatus eight feet from the wall. This made an angle of thirty-seven degrees. The height of the bar was adjusted to the hip level of the girl taking the test. The student grasped the bar with palms facing away from the body with the body under the bar and the arms fully extended. The legs and body comprised a straight line. The feet were anchored at the end of the apparatus so that when the pull-up was made the student's chest touched the bar. The student alternately raised the body until the chest touched the bar, and then returned to a full hang position. One pull-up was scored each time the student completed a pull-up. (See Appendix, Figure 3, page 25.)

The second experimental test group used the apparatus set with one end of the apparatus seven feet from the wall. This made an angle of forty-five degrees. The height of the bar was adjusted two inches below the apex of the sternum of the girl taking the test. The student grasped the bar with palms facing away from the body with the body under the bar and the arms fully extended. The legs and body comprised a straight line. The feet were anchored at the end of the apparatus so that when the pull-up was made the student's chest touched the bar. The student alternately raised the body until the chest touched the bar and then returned to a full hang position. One pull-up was scored each time the student completed a pull-up. (See Appendix, Figure 4, page 25.)

The third experimental test group used the apparatus set with one end of the apparatus six feet from the wall. This made an angle of fifty-three degrees. The height of the bar was adjusted at the chest level of the girl taking the test. The student grasped the bar with palms facing away from the body with the body under the bar and the arms fully extended. The legs and body comprised a straight line. The feet were anchored at the end of the apparatus so that when the pull-up was made the student's chest touched the bar. The student alternately raised the body until the chest touched the bar and then returned to a full hang position. One pull-up was scored each time the student completed a pull-up. (See Appendix, Figure 2, page 24.)

The scores of the students tested were recorded and analyzed through the use of approved statistical procedures. A Zero order correlation, using the Pearson Product-Moment Correlation Coefficient, was calculated between the Gay Apparatus and each of the three experimental groups.

In addition, the Fisher t was computed to determine if there were a significant difference between any of the three experimental group scores and the Gay Apparatus group scores.

CHAPTER IV

ANALYSIS OF DATA

Zero order correlations using the Pearson Product-Moment Correlation Coefficient were computed to determine the correlations between the Gay Apparatus and the three experimental apparatus groups. In addition, the Fisher t was computed to determine if there were a significant difference in any of the experimental groups when compared with the Gay Apparatus.

A correlation using ninety subjects was computed between the Gay Apparatus and the experimental apparatus number one. An $r = .83$ correlation was found between the Gay Apparatus and the experimental apparatus number one. The mean of the Gay Apparatus was 7.44 and the mean of the experimental apparatus number one was 3.44 with a difference of 4.00. The standard deviation for the Gay Apparatus was 3.01 and the standard deviation for the experimental apparatus number one was 2.31. The Fisher t was computed to determine if there were a significant difference between any of the three groups. The Fisher t between the Gay Apparatus and the experimental apparatus number one was $t = 22.80$. There was a significant

difference between the Gay Apparatus and the experimental apparatus number one. (See Appendix, Tables 1 and 2, page 26.)

A correlation using eighty-seven subjects was computed between the Gay Apparatus and the experimental apparatus number two. An $r = .84$ correlation was determined between the Gay Apparatus and the experimental apparatus number two. The mean of the Gay Apparatus was 7.31 and the mean of the experimental apparatus number two was 4.95 with a difference of 2.36. The standard deviation for the Gay Apparatus was 3.20 and the standard deviation for the experimental apparatus number two was 2.56. The Fisher t between the Gay Apparatus and the experimental apparatus number two was $t = 10.26$. There was a significant difference between the Gay Apparatus and the experimental apparatus number two. (See Appendix, Tables 1 and 2, page 26.)

A correlation using eighty-seven subjects was computed between the Gay Apparatus and the experimental apparatus number three. An $r = .85$ correlation was determined between the Gay Apparatus and the experimental apparatus number three. The mean of the Gay Apparatus was 7.31 and the mean of the experimental apparatus number three was 7.77 with a difference of .46. The standard deviation for the Gay Apparatus was 3.20 and the standard deviation for the experimental apparatus number three was 3.55. The Fisher t between the Gay Apparatus and the experimental apparatus number

three was t = .718. There was no significant difference between the Gay Apparatus and the experimental apparatus number three. (See Appendix, Tables 1 and 2, page 26.)

The experimental apparatus group number three was superior to the experimental apparatus groups number one and number two, showing no significant difference, while the experimental number one and two showed a significant difference. The experimental group three was shown to be comparable to the Gay Apparatus.

CHAPTER V

SUMMARY, CONCLUSION, RECOMMENDATIONS

Evidence throughout the years has shown that there are several different methods of administering the modified pull-ups for girls. A. E. Gay invented a device that greatly improved the administration of the girls' modified pull-up test.

The purpose of this study was to find a method of administering pull-ups for girls that would be as accurate as the Gay Apparatus, with less expense and less work for the administrator. To determine this, a correlation between the number of modified pull-ups achieved on the Gay Apparatus and the number of modified pull-ups on an experimental apparatus was tested.

The group selected for this study was composed of one hundred Central Washington State College women enrolled spring quarter in the service classes of basic skills and body conditioning. Testing was conducted during three consecutive weeks of April, 1969. During this time four groups of twenty-five women in each group were tested. The four groups were tested on the Gay Apparatus and the experimental apparatus set at three different levels.

A Zero order correlation using the Pearson Product-Moment Correlation Coefficient was calculated between the Gay Apparatus and each of the three experimental groups. In addition the Fisher t was computed to determine if there were a significant difference between any of the three experimental tests and the Gay Apparatus.

CONCLUSIONS

The hypothesis that no significant correlation between the Gay Apparatus and experimental groups one and two was accepted inasmuch as the Fisher t's were 22.80 and 10.26 respectively.

The null hypothesis that no significant correlation between the number of pull-ups obtained on the Gay Apparatus and experimental apparatus three was rejected. The results showed a correlation of .85 with the Gay Apparatus and experimental group three thus showing a similarity of results. In addition, a Fisher t of .718 was obtained between the same two tests showing the tests were not significantly different.

The experimental apparatus three which has the floor end of the apparatus set six feet from the wall forming an angle of 53 degrees with the floor is an acceptable measuring device for girls' modified pull-ups.

RECOMMENDATIONS

The following recommendations were determined from the results of this study:

The experimental apparatus number three should be used for the testing of the modified pull-ups for girls.

It is recommended that this study be administered to secondary or elementary girls to see if the same results would be found.

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APPENDIX

Figure 1

Gay Apparatus

Figure 2

Experimental Apparatus
Number Three

Figure 3

Experimental Apparatus
Number One

Figure 4

Experimental Apparatus
Number Two

TABLE I

CORRELATIONS AND t's OF THE THREE EXPERIMENTAL GROUPS WITH THE GAY APPARATUS

Group	r	t	Significance
Experimental Group I	.83	22.80	.01
Experimental Group II	.84	10.26	.01
Experimental Group III	.85	.718	no

TABLE II

MEANS AND STANDARD DEVIATIONS OF EACH OF THE FOUR GROUPS

	N	Mean	Standard Deviation
Gay Apparatus	90	7.44	3.01
Experimental Group I	90	3.44	2.31
Gay Apparatus	87	7.31	3.20
Experimental Group II	87	4.95	2.56
Experimental Group III	87	7.77	3.55