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The Effects Of A Weight Training Program For College Women

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THE EFFECTS OF A WEIGHT TRAINING PROGRAM
FOR COLLEGE WOMEN



WHITE

1955

HELEN SPRIGGINS WHITE

- 1928 Born in Beaumont, Texas
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DIVISION OF GRADUATE STUDY

PRAIRIE VIEW AGRICULTURAL AND MECHANICAL COLLEGE

FINAL EXAMINATION

of

HELEN SPRIGGINS WHITE


For the Degree of

MASTER OF SCIENCE

Wednesday, August 10, 1955 4:00 P.M. Ed 106

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H. L. McKinnis	Professor of Physical Education
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Major Field: Physical Education

- PE 423 Intramural Sports
- PE 653 Administrative Problems in Physical Education
- PE 673 Physiology of Muscular Exercise
- PE 713 Tests and Measurements in Physical Education
- PE 713 Techniques of Research
- PE 723 Kinesiology
- PE 843 Recreation Problems

Minor Field: Health Education

- Ed 891 Health Institute
- PE 553 Driver Education
- PE 593 Principles of Health Education
- Psy 593 Pupil Growth and Development

BRIEF OF THESIS

THE EFFECTS OF A WEIGHT TRAINING PROGRAM FOR COLLEGE WOMEN

The purpose of this study was to determine if a weight training program would result in differences in appearance, strength increase and anthropometric measurements for men and women.

THE EFFECTS OF A WEIGHT TRAINING PROGRAM
FOR COLLEGE WOMEN

by

Helen White

A Thesis Submitted in Partial Fulfillment
of the Requirements for the Degree of

Master of Science

in the

Graduate Division

of

Prairie View Agricultural and Mechanical College

Prairie View, Texas

August, 1955

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H.W.

John C. Mitchem

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Chapter I

INTRODUCTION

Most teen age girls resort to excuses to avoid participating in physical education or sports. Some excuses commonly heard are: Illness, can't shower, Mother forbids them to participate, didn't have time to wash their uniform, forgot to bring their uniform with them. They seem to want to remain dainty at all times probably feeling that this is necessary to make a favorable impression on the opposite sex. They fail to realize the value of exercise.

According to Kraus and Hirschland¹ too little attention has been paid to the fact that the dropping of muscular fitness below a certain minimum, actually jeopardize well being and health.

There are many ways to develop muscular strength. A well organized weight training program is one method quite frequently used. Although this type of exercise program is usually distained especially for women, the following quotation gives one opinion of women participating in

¹ Hans Kraus, M.D., and Ruth P. Hirschland, "Muscular Fitness and Health," Journal of Health, Physical Education and Recreation, December, 1953.

a weight training program.

Many women seem to be of the opinion that barbell exercise is for men only. However it has been proven by thousands of women that no other method exists which will give them a beautiful and perfect figure as quickly as will a properly arranged and applied barbell course.²

A number of women avoid exercise because they feel that it might make them muscular and masculine. Since this is the opinion of so many women it is of interest to determine do women actually develop strength and muscular appearance similar to men?

Statement of the Problem

The purpose of this study was to determine if a weight training program would result in differences in appearance, strength increase and anthropometric measurements for men and women. The musculature of both of the upper arms was used for this experimentation.

2

Peggy O'Neil, "Is There a Magic Clue?" Iron Man, Vol. 12, No. 1, June-July, 1952, p. 58.

Chapter II

REVIEW OF LITERATURE

One of the most fundamental of physiological laws is that the functional efficiency of an organ or system improves with use and regresses with disuse.

"Exercise stimulates and regulates the glandular action of the body, the metabolism is normalized, circulation is regulated, and the entire digestive system is helped to function as it normally should."³

"One of the most important aims of a program of physical education is the development of motor skills. The arm and shoulder strength have been shown to be of great importance in motor activities."⁴

"Physicians and physical educators alike are becoming increasingly aware of the fact that improvement in the postural tone of the skeletal muscles is one of the most important benefits of regular exercise."⁵

³ Lawrence E. Morehouse and Augustus T. Miller, Physiology of Exercise, St. Louis: C. V. Mosby Company, 1948, pp. 210-211.

⁴ Ibid.

⁵ Ibid.

"The Maintenance of muscular strength at a certain level which supports the daily activities and allows for emergency physical activity and occasionally prolonged periods when adequate nutrition and hours of rest are reduced is definitely necessary."⁶

If a sufficient reserve of muscular strength is maintained daily tasks are performed with greater ease and efficiency, in greater quantities and with less fatigue.

A well organized weight training program is one method quite frequently used in developing muscular strength. According to Morehouse and Miller⁷ a properly planned weight training program using dumbbells and barbells will give rapid increase in strength of weak muscles.

There have been difference of opinions as to whether weight training actually belongs in the physical education program. Dr. James E. Conselman⁸ reported about weight training in the physical education program. The results of his study were published in an article entitled

⁶

Ibid, p. 232.

⁷

Ibid, p. 233.

⁸

James E. Counsilman, "Does Weight Training Belong in the Program?" Journal of Health, Physical Education and Recreation, January, 1955.

"Does Weight Training Belong in the Program?"

From the point of view of physiologists of the physical educators and coaches, it appeared to him that weight training did have a place in the physical education program. However a realization of the advantages and limitations of weight training must be clearly understood before a program of this sort can become an asset.

Chui⁹ in his study on the effect of weight training on athletic power indicated that the subjects in the experimental group which practiced systematic weight training seemed to increase in the amount of potential power, where as the subjects in the control group who did no weight training failed to show any gain.

Capen¹⁰ pointed out that weight training is the most effective form of physical training for increasing muscular development, and that exercise with weights produces an optimum physical condition in a minimum of time.

Wilkins¹¹ found in his study that weight lifters

9
Edward Chui, "The Effect of Systematic Weight Training on Athletic Power," Research Quarterly, 21, October 1950, pp. 188-194.

10
Edward K. Capen, "The Effect of Systematic Weight Training on Athletic Power," Research Quarterly, 21, May 1950, pp. 83-93.

11
Bruce M. Wilkins, "The Effect of Weight Training on Speed of Movement," Research Quarterly, 23, October 1952, pp. 361-369.

are not "muscle bound" in the sense that his speed of movement is impaired. That his speed is as great as that of other students studied, and improves as much or more during the training period. The results suggest that daily training with weights may improve muscular endurance.

Professor Arthur J. Wendler,¹² of the State University of Iowa, says,

I believe, and say so in all my classes that any athlete will be a better athlete, regardless of his sport, if he will engage in serious training with the weights. State University of Iowa has offered physical education courses in weight training since 1944, and professor Wendler reports many of his students have graduated into the field of coaching and have successfully used barbell exercise to condition and strengthen their charges.

Women in some cases are not too interested in participating in any type of organized exercise. They feel that it will make them muscular and masculine. Actually the weight training program is still a controversial issue where men are concerned much rather women. "However it was found, as a result of a weight training course set up by Peggy O'Neil,¹³ that the general appearance, skin, posture,

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Jim Murray, Weight Lifting, New York: A. S. Barnes and Company, 1954, p. 16.

13

O'Neil, op.cit.

health and figure of the women participating were favorably enhanced. Ramifications of this article are important to this study.

Chapter III

PROCEDURE

Two groups were used for this study, seven young ladies and seven young men. All of the subjects were enrolled at Prairie View Agricultural and Mechanical College.

Pictures, at a distance of approximately three and one half feet, were taken of each subject's right and left arm before and at the completion of the exercise program. The following anthropometric measurements were taken before and at the completion of the exercise program:

Girth Measurements

Girth of Upper Arm

Girth of Upper Arm Contracted

Fat Measurements

Anterior

Posterior

Lateral

Medial

A weight training program was organized for each individual. Each subject was given a weight that he or she could curl between seven and ten times. When the subject was able to curl a weight twelve times or more times

two and one half additional pounds were added. The daily exercise program was divided into three bouts, with a five minute rest period between each bout. A record of the number of curls of each bout for each subject was recorded. The subjects met three times a week for a period of four weeks. Tables were constructed and the data was statistically analyzed.

Chapter IV

ANALYSIS OF DATA

A composite of the data is shown for each subject in Tables I through XIV, pages 11 to 24. These tables contained pictures and anthropometric measurements, fat and girth, all of which were taken before and after the exercise program.

It was interesting to note that the girth measurements for the female subjects decreased while the girth measurements for the male subjects increased. See Table XVI, page 27. One would assume from this finding that the musculature of women does not follow the general rule of hypertrophy due to use as does the musculature of men. However, before drawing this conclusion, one should observe Table XV, page 26 containing fat measurements.

It is observed that women had much higher fat measurements than the men and there was a much greater loss in fat for women after the exercise program than for men. Also from the pictures it is difficult to see any change in the musculature that might be termed masculine or called bulging muscle.

The increase in strength for both the male and

TABLE I

Subject 1

Before Exercise Program



After Exercise Program

Girth Measurements

	<u>Before</u>	<u>After</u>
Girth of right arm	25.5	24
Girth of left arm	24	23.5
Girth of right arm contracted	25.9	25
Girth of left arm contracted	24.7	25

Fat Measurements

	<u>Right Arm</u>		<u>Left Arm</u>	
	<u>Before</u>	<u>After</u>	<u>Before</u>	<u>After</u>
Anterior	13	11	7	7
Posterior	13	12	11	8
Lateral	14	12	10	10
Medial	10	6	9	5

TABLE II

Subject 2

Before Exercise Program



After Exercise Program

Girth Measurements

	<u>Before</u>	<u>After</u>
Girth of right arm	25.2	25
Girth of left arm	25.5	23.5
Girth of right arm contracted	26.5	26
Girth of left arm contracted	26.3	24.5

Fat Measurements

	<u>Right Arm</u>		<u>Left Arm</u>	
	Before	After	Before	After
Anterior	15	15	5	5
Posterior	12	12	13	10
Lateral	13	12	14	13
Medial	8	5	9	9

TABLE III

Subject 3

Before Exercise Program



After Exercise Program

Girth Measurements

	<u>Before</u>	<u>After</u>
Girth of right arm	25.7	25.5
Girth of left arm	25.6	25.5
Girth of right arm contracted	27.5	25.5
Girth of left arm contracted	27.5	27

Fat Measurements

	<u>Right Arm</u>		<u>Left Arm</u>	
	Before	After	Before	After
Anterior	5	4	11	3
Posterior	11	10	15	9
Lateral	15	14	12	10
Medial	5	4	10	9

TABLE IV

Subject 4

Before Exercise Program

After Exercise Program

Girth Measurements

	<u>Before</u>	<u>After</u>
Girth of right arm	23.5	23.2
Girth of left arm	23	22.5
Girth of right arm contracted	24.3	23.7
Girth of left arm contracted	23.5	23.5

Fat Measurements

	<u>Right Arm</u>		<u>Left Arm</u>	
	Before	After	Before	After
Anterior	6	4	11	4
Posterior	14	10	11	10
Lateral	14	5	15	6
Medial	6	6	4	5

TABLE V

Subject 5

Before Exercise Program



After Exercise Program

Girth Measurements

	<u>Before</u>	<u>After</u>
Girth of right arm	20.1	20.5
Girth of left arm	19.2	19.5
Girth of right arm contracted	23	22
Girth of left arm contracted	20.6	21.3

Fat Measurements

	<u>Right Arm</u>		<u>Left Arm</u>	
	<u>Before</u>	<u>After</u>	<u>Before</u>	<u>After</u>
Anterior	5	4	5	6
Posterior	7	7	10	8
Lateral	10	6	8	7
Medial	3	3	4	5

TABLE VI
Subject 6

Before Exercise Program



After Exercise Program



Girth Measurements

	<u>Before</u>	<u>After</u>
Girth of right arm	24	24
Girth of left arm	22.4	23
Girth of right arm contracted	25.7	25.5
Girth of left arm contracted	25	24.9

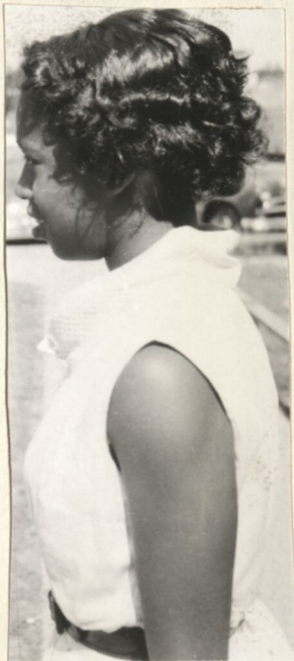
Fat Measurements

	<u>Right Arm</u>		<u>Left Arm</u>	
	<u>Before</u>	<u>After</u>	<u>Before</u>	<u>After</u>
Anterior	5	5	5	5
Posterior	10	9	9	11
Lateral	13	12	11	10
Medial	8	6	7	7

TABLE VII

Subject 7

Before Exercise Program



After Exercise Program

Girth Measurements

	<u>Before</u>	<u>After</u>
Girth of right arm	24.3	23.7
Girth of left arm	23	22.8
Girth of right arm contracted	25	25.5
Girth of left arm contracted	24.6	24.5

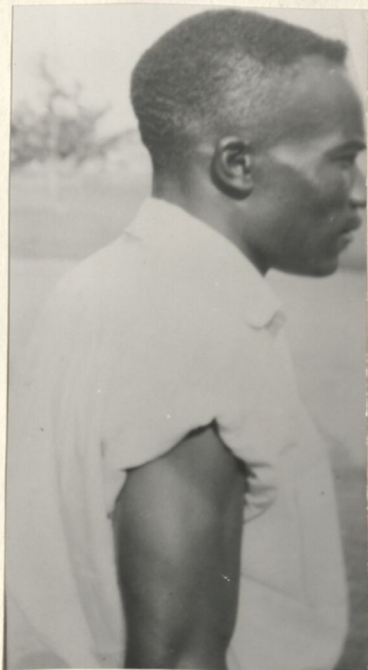
Fat Measurements

	<u>Right Arm</u>		<u>Left Arm</u>	
	<u>Before</u>	<u>After</u>	<u>Before</u>	<u>After</u>
Anterior	3	2	7	5
Posterior	10	8	11	10
Lateral	10	8	7	6
Medial	4	3	4	3

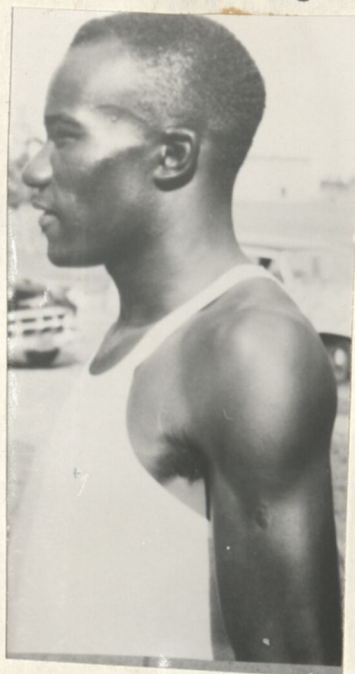
TABLE VIII

Subject 8

Before Exercise Program



After Exercise Program

Girth Measurements

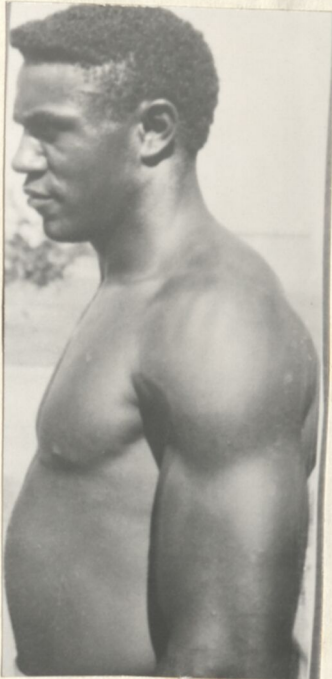
	<u>Before</u>	<u>After</u>
Girth of right arm	28.5	28
Girth of left arm	27.2	27.5
Girth of right arm contracted	28.6	30.4
Girth of left arm contracted	27.3	29.4

Fat Measurements

	<u>Right Arm</u>		<u>Left Arm</u>	
	Before	After	Before	After
Anterior	4	3	4	3
Posterior	6	4	5	4
Lateral	5	4	5	4
Medial	4	3	5	3

TABLE IX
Subject 9

Before Exercise Program



After Exercise Program



Girth Measurements

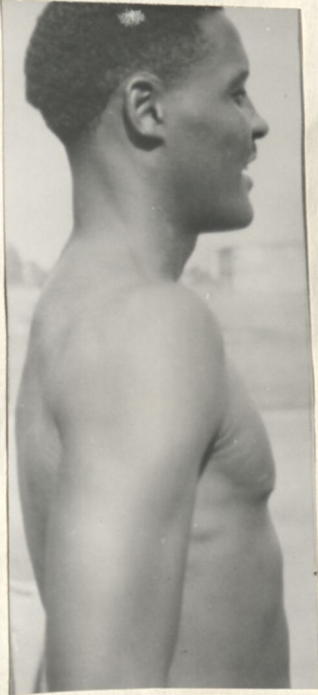
	<u>Before</u>	<u>After</u>
Girth of right arm	33	34
Girth of left arm	33	36
Girth of right arm contracted	33.3	38.5
Girth of left arm contracted	33.5	39.5

Fat Measurements

	<u>Right Arm</u>		<u>Left Arm</u>	
	<u>Before</u>	<u>After</u>	<u>Before</u>	<u>After</u>
Anterior	3	3	3	2
Posterior	5	4	4	3
Lateral	4	3	4	2
Medial	3	2	3	2

TABLE X
Subject 10

Before Exercise Program



After Exercise Program



Girth Measurements

	<u>Before</u>	<u>After</u>
Girth of right arm	30.5	31.5
Girth of left arm	29.5	30
Girth of right arm contracted	34.5	33.6
Girth of left arm contracted	32.9	32

Fat Measurements

	<u>Right Arm</u>		<u>Left Arm</u>	
	<u>Before</u>	<u>After</u>	<u>Before</u>	<u>After</u>
Anterior	4	3	4	3
Posterior	7	7	8	7
Lateral	6	6	6	6
Medial	4	5	3	3

TABLE XI

Subject 11

Before Exercise Program



After Exercise Program

Girth Measurements

	<u>Before</u>	<u>After</u>
Girth of right arm	25.7	25.1
Girth of left arm	25.5	25.2
Girth of right arm contracted	26.5	28.3
Girth of left arm contracted	25.6	27.5

Fat Measurements

	<u>Right Arm</u>		<u>Left Arm</u>	
	Before	After	Before	After
Anterior	8	2	4	3
Posterior	5	4	8	6
Lateral	7	6	7	7
Medial	3	2	4	2

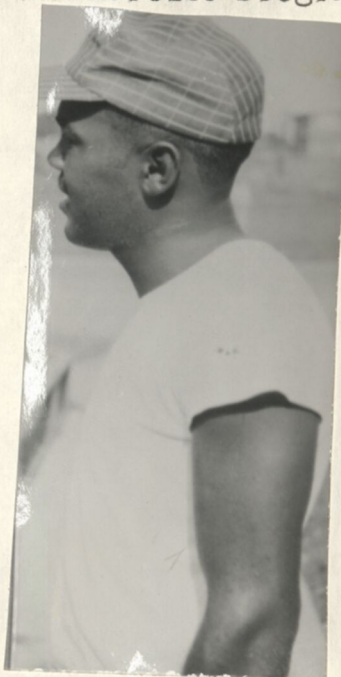
TABLE XII

Subject 12

Before Exercise Program



After Exercise Program

Girth Measurements

	<u>Before</u>	<u>After</u>
Girth of right arm	30	29.8
Girth of left arm	30.1	29
Girth of right arm contracted	32.7	33.5
Girth of left arm contracted	30.5	33

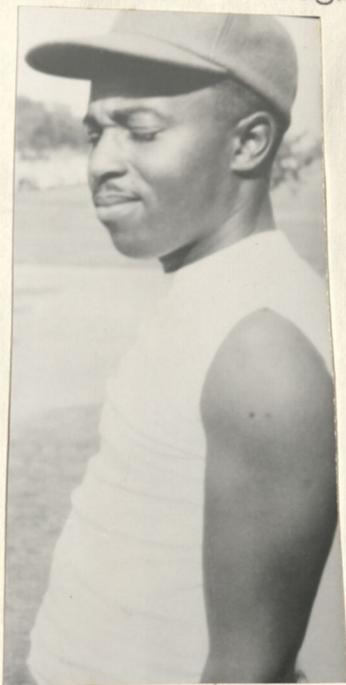
Fat Measurements

	<u>Right Arm</u>		<u>Left Arm</u>	
	<u>Before</u>	<u>After</u>	<u>Before</u>	<u>After</u>
Anterior	5	4	5	4
Posterior	5	4	4	4
Lateral	5	6	5	5
Medial	3	3	3	4

TABLE XIII

Subject 13

Before Exercise Program



After Exercise Program

Girth Measurements

	<u>Before</u>	<u>After</u>
Girth of right arm	30	30
Girth of left arm	28.5	29.4
Girth of right arm contracted	31	32.3
Girth of left arm contracted	30	32

Fat Measurements

	<u>Right Arm</u>		<u>Left Arm</u>	
	<u>Before</u>	<u>After</u>	<u>Before</u>	<u>After</u>
Anterior	4	6	6	5
Posterior	8	6	11	7
Lateral	9	7	6	6
Medial	6	5	4	5

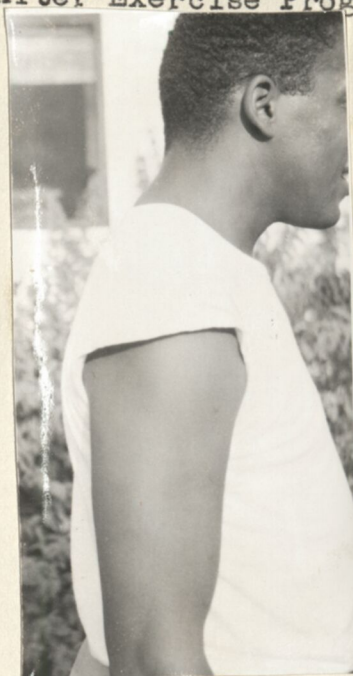
TABLE XIV

Subject 14

Before Exercise Program



After Exercise Program

Girth Measurements

	<u>Before</u>	<u>After</u>
Girth of right arm	31.5	31.5
Girth of left arm	31.2	30
Girth of right arm contracted	33.4	33.1
Girth of left arm contracted	33	32

Fat Measurements

	<u>Right Arm</u>		<u>Left Arm</u>	
	Before	After	Before	After
Anterior	5	5	7	10
Posterior	11	5	10	9
Lateral	15	14	12	10
Medial	8	7	5	5

female subjects followed the same pattern. See Tables XVII and XVIII, pages 28 and 29. Therefore one can reasonably assume the pattern of hypertrophy of muscular tissue followed the same pattern for both male and female subjects, but due to the presence and loss of more fatty tissue by women, their arms actually were smaller after the exercise program than before. Since the original hypothesis was to determine if the female subjects developed large, bulging muscles and the measurements were found to be smaller in all cases no statistics were computed.

TABLE XV
Fat Measurements

	<u>Female</u>		<u>Male</u>	
	Before	After	Before	After
Anterior right arm	*6	*5	*4.7	*3.7
Anterior left arm	7.2	5	4.7	4.3
Posterior right arm	11	9.7	6.7	4.9
Posterior left arm	11.4	7.4	7.1	5.7
Lateral right arm	12.7	9.8	7.3	6.6
Lateral left arm	11	8.8	6.4	5.7
Medial right arm	6.2	4.7	4.3	3.6
Medial left arm	6.7	6.1	4.1	3.4

*The figures shown represent means.

TABLE XVI

Girth Measurements

	<u>Females</u>		<u>Males</u>	
	<u>Before</u>	<u>After</u>	<u>Before</u>	<u>After</u>
Right arm	24*	23.7*	29.9*	30*
Left arm	23.2	22.9	29.2	29.6
Right arm contracted	25.5	24.7	31.4	32.8
Left arm contracted	24.6	24.4	30.4	31.5

TABLE XVII

The Strength Increase During the Exercise
Program for Female Subjects

Sub- jects	Start- ing Weight	Weeks				To- tal	Sub- jects	Start- ing Weight	Weeks				To- tal
		I	II	III	IV				I	II	III	IV	
1	7½	2½	2½	2½	2½	10	1	7½	2½	2½	2½	2½	10
2	10	2½	2½	2½	2½	10	2	10	2½	2½	2½	2½	10
3	10	5	2½		2½	10	3	10	5	2½		2½	10
4	7½	2½	2½		2½	7½	4	7½	2½	2½		2½	7½
5	7½		2½		2½	5	5	7½		2½		2½	5
6	7½		2½	2½		5	6	7½		2½	2½		5
7	7½	2½	2½		2½	7½	7	7½	2½	2½		2½	7½
37.5 15 17.5 7.5 15 55							37.5 15 17.5 7.5 15 55						
5.3 2.1 3 1.1 2.1 8							5.3 2.1 3 1.1 2.1 8						

TABLE XVIII

The Strength Increase During the Exercise Program for Male Subjects

Sub- jects	Start- ing Weight	Weeks				To- tal	Sub- jects	Start- ing Weight	Weeks				To- tal
		I	II	III	IV				I	II	III	IV	
8	23	2½	2½	5		10	8	23	2½	2½	2½	3	10½
9	40	2½	5	2½		10	9	35	2½	3	2½		2½10½
10	23	2½	3		2½	8	10	23	2½	2½			2½ 7½
11	23	2½	2½	2½	3	10½	11	23		2½			2½ 5
12	23	2½	3	3	3	11½	12	23	2½	2½	2½		7½
13	23	2½	2½	2½		7½	13	23	2½	2½	5	3	13
14	23	2½	2½		2½	7½	14	23	2½	2½			2½ 7½
	178	17.5	21	15.5	11	65		173	15	18	12.5	16	61.5
	25	3	3	2.2	1.5	9.3		24	2.1	3	2	2.2	9

Chapter V

SUMMARY

A study to determine if female subjects develop large, bulging muscles from a systematic weight training program was done. Fourteen Prairie View Agricultural and Mechanical College students, seven male and seven female, were used as subjects for this investigation. It was found that musculature of the female subjects not only did not increase in size but actually decreased in size

Chapter VI
CONCLUSIONS

On the basis of the evidence presented in this investigation, it was concluded that systematic weight training does not produce bulging, masculine type musculature in women.

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