

EVALUATION AND TESTING OF HEALTH
RELATED FITNESS FOR AN ADULT FITNESS CLASS

by

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B. A., Colorado State College, 1969

9589

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

1972

Approved by:


Major Professor

LD
2648
R4
1972
R66
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ACKNOWLEDGMENT

I would like to take this opportunity to express my sincere appreciation to Dr. Charles B. Corbin, chairman of the department of Physical Education at Kansas State University, for his guidance in the writing of this report and encouragement and leadership as an instructor in my chosen profession. Special thanks are also extended to Mr. Evans, Mr. Snyder and Dr. Littrell for their understanding and encouragement during my education at Kansas State University.

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Chapter 1

INTRODUCTION

Physical education has been the object of many studies in the last thirty years. The results have shown a less than fit American youth. Probably the most publicized study is that of Kraus and Weber,¹ which shows a poor performance level by American children as compared to children in other countries. The results of this study show that American children are less than fit, but actual school practices do not present sound programs for eliminating this problem.

The major emphasis in most testing has been on the number of pull-ups and sit-ups one can do, or how far one can throw a softball. For the most part, these are tests of skill related fitness. Although evidence has been submitted to indicate that all aspects of fitness contribute to the mental and physical well being of man, there are specific areas that are necessary for his healthful existence. These areas are known as the health related aspects of fitness.² They are muscular endurance, flexibility, cardiovascular endurance and strength. For the purpose of this report, body fat will be included as an aspect of health fitness and muscular endurance will not be considered.

The areas of health fitness and the prevention of hypokenetic disease³

¹H. Hirschland and Hans Kraus, "Minimum Muscular Fitness Tests in School Children," Research Quarterly, 25:178-187, 1954.

²Charles Corbin and others, Concepts in Physical Education (Dubuque: Wm. C. Brown Company Publishers, 1970), p. 4.

³Hans Kraus and W. Raab, Hypokenetic Disease (Springfield: Charles C. Thomas Publisher, 1961), pp. 3-8.

have been shown to be directly or indirectly related to one another. In addition to the neglect of the health fitness areas, most of the testing has concerned itself with our youth. The idea that a nation is as fit as its youth is probably true to a certain extent, but hypokinetic diseases are a major problem, mainly to persons over twenty years of age. It would seem that future testing should be planned for the health fitness areas and that persons of all ages be included in the testing.

PURPOSE

The purpose of this study was threefold: (1) to determine the levels of health fitness for a group of faculty, upon enrolling in a faculty fitness class at Kansas State University; (2) to investigate the levels of desirability as established for the evaluation of this class; and (3) to establish norms for the evaluation of the effectiveness of this class.

LIMITATIONS OF STUDY

The subjects who participated in the study were classified into four groups with the distribution of young to old and men to women varying greatly. This factor will limit inter-group comparisons. Class enrollment was limited to faculty members and their families. This would limit the use of the norms established to groups with similar characteristics. Also, no correction factors were figured for the older groups on any of the tests. This may reduce the validity of norms for use by the older age groups.

In order to test all of the subjects prior to the beginning of the class, lab testing was done from 7:30 in the morning to 4:00 p.m. The effect of the testing time is difficult to assess because different persons peak at different times of the day. Failure of the group to perform well on any given

test is subject to the a priori standard. As a result of these limiting factors, the collected data has little value as a predictor for other groups but should be of significant value for a comparative analysis to future fitness classes at Kansas State and for the post testing of the participating group.

DEFINITION OF TERMS

Cardiovascular Endurance:	the ability to sustain prolonged activity without overtaxing the physiological functions of the body.
Flexibility:	the ability to move the joint and muscle throughout its entire movement range.
Health Fitness:	aspects of physical fitness that are related to hypokenetic disease. For the purpose of this report areas of health fitness were cardiovascular endurance, strength, flexibility, and the percent of body fat.
Hypokenetic Disease:	those diseases directly or indirectly related to physical condition, particularly to the aspects of health fitness. Example: diabetes, low back pain, and atherosclerosis.
Obesity:	overfat condition, most often referred to as 20 percent to 25 percent of the body composition as fat.
Strength:	the amount of external force that a muscle group can exert.

Chapter 2

REVIEW OF LITERATURE

Great difficulty was encountered in researching periodical literature for this report. Although much research has been done on fitness as such, the majority of the literature deals with motor fitness or the establishment of norms for tests similar to the AAHPER fitness test. Also, as mentioned in the introduction, the majority of the testing has been done with subjects under twenty years of age. This has probably been due to the difficulty in gathering a group above school age. Papers offered as examples of this trend are those of Goodpaster⁴ and Atkinson.⁵

Norms were found for age groups for predicted Maximum Oxygen Uptake.⁶ However, these were established for Swedish males and females. These norms would not be applicable to the group tested for this report but might be of value in the establishment of levels of desirability, as cardiovascular disease is not a major problem in Sweden. The scores of most value to this report were those of the age groups 20-29 and 40-49. The ranges established as average were the following: 2.00-2.49 for women 20-29; 1.80-2.29 for women 40-49; 3.10-3.69 for men 20-29; and 2.50-3.09 for men 40-49.

⁴L. Goodpaster, "A Study of Physical Fitness of Seventh-Eighth Grade Boys of Unified School District #378 Riley County, Kansas 1965-1966" (unpublished Master's Report, Kansas State University, 1966).

⁵R. Atkinson, "A Analysis of a Physical Fitness Testing Program in Cherokee County Rural High School" (unpublished Master's Report, Kansas State University, 1963).

⁶Per-Olof Astrand, "Aerobic Work Capacity in Men and Women with Special Reference to Age," Acta, Physiologica Scandinavica, Supplement 169 (1960), p. 49.

Cureton's tests of flexibility⁷ were used by Cureton to test champion athletes. The results of this testing were not applicable to this report as the subjects tested in his studies were athletes of olympic caliber.

Norms for the Wells' sit and reach test were established for college freshmen at Texas A & M University by Dr. Charles Corbin. The average scores were found to be 12 for men and 8 for women.⁸ This is most interesting as women are generally thought to possess more flexibility than men.

Although much has been written about the use of dynamometers in the testing of strength, the lack of research showing actual results would suggest that their use has been somewhat limited. One explanation for their limited use might be that methods of testing strength have emphasized techniques that can be used easily for the testing of large groups. These tests would include pull-ups, sit-ups, and push-ups. Also, researchers of muscle strength have used tensiometers to enable them to be more specific as to the muscle groups tested. There were two existing norms which were established for the strength areas tested in this report. In 1937, Earla Driftmier⁹ tested college age women for back, leg, forearm and chest strength and established norms of 169 pounds for back and 213 pounds for leg strength. Norms for college age men and women were contained in Corbin's Concepts in Physical Education.¹⁰ The average scores for women were 125 pounds back strength, 142 pounds leg strength, 124 pounds left grip, 131 pounds right grip strength, 3.91 pounds

⁷Thomas Kirk Cureton, Physical Fitness of Champion Athletes (Urbana: The University of Illinois Press, 1951), pp. 86.

⁸Corbin, pp. 156.

⁹Earla Driftmier, "Strength Test Norms for College Women Entrants," Research Quarterly, 8:80-85, March, 1937.

¹⁰Corbin, pp. 161.

strength per pound of body weight. The average scores for men were 131 pounds right grip, 124 pounds left grip strength, 445 pounds leg, 243 pounds back strength and 5.83 pounds strength per pound of body weight. The large difference in Driftmier's findings as compared to Corbin's might be due to the use of belt in the testing by Driftmier.

Although obesity has been a problem that the general public has been aware of, and one they have attempted to deal with, the problem still exists. Literature about the validity of skinfold measurements for the determination of body fat is abundant, but little was found concerning the establishment of norms or the establishment of desirable levels. Too often the criteria for the determination of body fat is the use of a height-weight chart. The ease of administration of this method has probably made it a preferred practice regardless of its validity.

The great lack of literature as to the actual application of these tests for the determination of health fitness in adults would justify the purpose of this report. Also, the need for norms and the need to evaluate the effectiveness of the fitness class can be fulfilled by the results of this report.

Chapter 3

PROCEDURE

All the tests were administered in the research laboratory at Kansas State University, by trained technicians under the supervision of the author. The subjects were tested in four areas: flexibility, percent body fat, strength, and cardiovascular endurance. With the fitness class consisting of all volunteer subjects, the sample was representative of a motivated group of subjects. This would affect the results of these tests in relation to a normal sample.

Subjects

The subjects consisted of faculty members and their wives and husbands who voluntarily enrolled in an Adult Fitness Class. Probably the reasons for joining the class were: (1) the unfit had an opportunity to receive fitness instruction; (2) it gave the reasonably fit a chance for organized exercise; (3) some subjects wanted to be tested simply to satisfy their curiosity and never intended to participate in the class. The total number of subjects was 100. The subjects were classified into four groups according to sex and age. These groups were unequal in number with 29 men 20-34, 38 men 35-up, 18 women 20-34, and 15 women 35-up.

The subjects signed for a thirty minute laboratory period during which time they were tested as follows: Upon entering, they were instructed to sit for a five minute rest period. Medical and exercise information was gathered at this time. Next, they were tested for percent body fat, then strength, cardiovascular endurance and flexibility. This order was chosen for

speed in testing and also to give the subjects a warm-up exercise (bicycle test) before the testing of flexibility.

Body Fat

Body fat was determined by using skin folds obtained with the Lange skinfold caliper. Measurements were taken on the medial head of the tricep halfway between the olecranon and acromion processes, to the right of the navel, and above and to the right of the right nipple for men, and at the medial head of the tricep, and the crest of the ilium at the midline for women. These measurements were then plotted on Consolazio's nomogram¹¹ for determination of body fat for men and Irene Paul's nomogram¹² for determination of body fat for women.

Strength

Strength was tested for determination of right and left grip strength, back and leg strength and strength per pound of body weight. Grip strength was tested by using a hand dynamometer. The subjects were instructed to start with the arm hanging at the side and to apply the grip without allowing the arm to exceed a ninety degree angle. Back and leg strength were tested with a back and leg dynamometer. Leg strength was tested with knees flexed and back straight. The subjects were instructed to keep his shoulders over his hips and apply as much pressure to the bar as possible, using the legs only. Back strength was tested with legs straight, shoulders and back slightly rounded. The subjects were instructed, without any bending of the knees, to roll the

¹¹C. F. Consolazio, Physiological Measurements of Metabolic Functions in Man (New York: McGraw Hill, 1963), p. 307.

¹²Corbin, p. 170.

shoulders back and extend the chest applying as much pressure as possible to the bar. In both the tests for back and leg strength, subjects were to use a mixed grip. In both of these tests a belt was not used. This could have been a limiting factor as to the totals achieved by the subjects, but should be quite adequate for comparative analysis. The score of each test was then totaled and divided by body weight to determine strength per pound of body weight. Retests were administered at request of the subject, or if the subject was in an incorrect position at the conclusion of the test.

Cardiovascular Endurance

The measurement used for determination of cardiovascular endurance was predicted maximum oxygen uptake. Maximum oxygen uptake was predicted using the Astrand bicycle test.¹³ The subjects rode a bicycle ergometer for a six minute period at a given work load. During this ride the heart rate was recorded for the last minute. The work load and heart rate were then plotted on the Astrand and Rhyming's nomogram¹⁴ for the prediction of maximum oxygen uptake.

Flexibility

Flexibility measurements were taken for the determination of hip, shoulder, and back flexibility. Hip flexibility was determined through the use of a modified Wells' sit and reach bench.¹⁵ Modification was an adjustment of the reading at toe-touch from eleven to six inches. Sitting with feet

¹³Per-Olof Astrand and Kaare Rodal, Textbook of Work Physiology (New York: McGraw Hill, 1970), p. 387.

¹⁴Astrand, Textbook, p. 386.

¹⁵Donald Mathews, Measurement in Physical Education (Philadelphia: W. B. Saunders Company, 1963)

flat against the bench and knees straight, the subjects were instructed to reach as far forward as possible and hold for one second. Shoulder flexibility was tested through use of Cureton's test of shoulder extension backward.¹⁶ Lying prone on a mat, the subjects were to grasp a wooden rod at shoulder width and, keeping arms straight, raise the rod as high as possible keeping the chin on the mat. The score was the distance in inches that the rod was raised off of the mat. Back flexibility was measured using Cureton's test for trunk flexion backward.¹⁷ The subjects were to lie prone on a mat with hands clasped behind the head. The subjects were to raise the chin as high as possible off of the mat. The score was the distance in inches the chin was raised off of the mat.

STATISTICAL TREATMENT

Exercise and medical background and the test scores were recorded on a data sheet (Appendix A). Through the use of a computer, calculations were made to establish percentile scores for each group for all tests. These percentiles were used for the body of this report. Tables were also compiled to present the mean and standard deviation for all groups for all tests (Appendix B). Percentile scores were also calculated with separate scales for all men and all women (Appendix C).

¹⁶Cureton, p. 86.

¹⁷Cureton, p. 86.

Chapter 4

RESULTS

For each of the tests desirable levels of fitness were assigned by the instructor on the basis of a priori establishment (Appendix D). These levels are depicted in the tables of percentiles for each test by an astrisk in the left hand column for the levels assigned for men, and in the right column for women. Scores less than desirable are classified as failures.

Table I shows the percentile scores for maximum oxygen uptake, the means of testing cardiovascular endurance. Levels of desirability were set at 3.5 for men and 2.4 for women. The failure rate was 89.66% for men 20-34, 86.84% for men 35-up and 66.67% for both women groups. If the levels of desirability are truly indicative of desired fitness, it is interesting to note that men had a greater failure rate than women.

Percentiles for percent body fat are shown on Table II. Desirable levels were 10% for men and 14% for women. Failure to perform up to the desirable standards were as follows: 72.41% of men 20-34; 55.26% of men 35-up, and 100% of both groups of women were short of the desirable levels. There was a high failure rate for men 20-34 with almost three-fourths of the group below the desirable level. But the achievement rate for the older group was very promising with almost half of that group attaining or bettering the mark. The extremely low scores recorded for the women as compared to the desirable score of 14% would leave serious doubt as to the validity of this a priori standard.

Percentile scores for flexibility are shown on Tables III, IV, and V. Desirable levels for hip flexion were 10 and 12 for men and women respectively.

TABLE I

Maximum Oxygen Uptake

Liters O ₂	Men 20-34	Men 35-up	Women 20-34	Women 35-up	Liters O ₂
5.1	100.00				5.5
4.6	96.55	100.00			4.6
3.8		97.37			3.8
3.7		94.74			3.7
3.6	93.10	92.11			3.6
3.5*		89.47			3.5
3.4	89.66	86.84	100.00		3.4
3.3	86.21	84.21			3.3
3.2	82.76	81.58		100.00	3.2
3.1	79.31	78.95		93.33	3.1
3.0	65.52	73.68		86.67	3.0
2.9	62.07	68.42			2.9
2.8		65.79			2.8
2.7	58.62	60.53	94.44		2.7
2.6		50.00	83.33		2.6
2.5	51.72	44.74		80.00	2.5
2.4	44.83	36.84	77.78	73.33	2.4*
2.3	41.38	23.68	66.67		2.3
2.2	27.59	18.42		66.67	2.2
2.1	10.34	13.16			2.1
2.0	6.90	10.53		60.00	2.0
1.9	3.45		61.11	46.67	1.9
1.8		5.26	44.44		1.8
1.7		2.63	38.89	40.00	1.7
1.6			33.33	33.33	1.6
1.5					1.5
1.4			16.67	26.67	1.4
1.3				13.33	1.3
1.2			11.11	6.67	1.2
1.1					1.1
1.0			5.56		1.0

* Astrisk in left and right hand columns represent the levels of desirability for men and women respectively.

TABLE II

Percent Body Fat

% BF	Men 20-34	Men 35-up	Women 20-34	Women 35-up	% BF
3	100.00				3
4		100.00			4
5	96.55				5
6	93.10	97.37			6
7	89.66	94.74			7
8	86.21	92.11			8
9	82.76	81.58			9
10*	79.31	71.05			10
11	72.41	55.26			11
12					12
13	58.62	42.11			13
14	44.83	31.58			14*
15					15
16	41.38	28.95	100.00		16
17	27.59		94.44	100.00	17
18	24.14		88.89		18
19	20.69			93.33	19
20		18.42		80.67	20
21	17.24	15.79	83.33		21
22		13.16	66.67	73.33	22
23	10.34	7.89	50.00	53.33	23
24		2.63		20.00	24
25				13.33	25
26			33.33		26
27			27.78		27
28					28
29					29
30			16.67		30
31			11.11		31
32					32
33					33
34					34
35			5.56		35
36					36
37					37
38					38
39					39
40					40
41	3.45				41

The failure rate for hip flexibility was 72.41% for men 20-34, 86.84% for men 35-up, 72.22% for women 20-34, and 80.00% for women 35-up. The large number of scores falling below the desired levels are indicative of the neglect flexibility has received as an aspect of fitness.

Scores falling short of the desirable levels of 12 and 15 for men and women for shoulder flexibility (Table IV), were 27.59% for men 20-34, 55.26% for men 35-up, 61.11% for women 20-34, and 73.33% for women 35-up. It is interesting to note that the failure rate for men was much less than that for women on this test. Generally, women possess greater flexibility than men, and the desirable levels were established accordingly, but the results might suggest that this does not hold true for shoulder flexibility.

With the exception of one person, all subjects failed to score at or above the desirable levels of 20 for men and 21 for women for back flexibility (Table V). As in the results for women in percent of body fat, this would indicate an error in judgment as to the validity of the chosen standards.

Percentile scores for strength per pound of body weight are shown on Table VI. Levels of 6.4 for men and 4.2 for women were the levels of desirability. Failure rates were 75.86 for men 20-34, 84.21 for men 35-up, and 66.67 for women 20-34 and 35-up. An item of interest was the extremely high scores of 9.2 and 6.6 recorded for one male and one female respectively.

Tables for grip, back and leg strength were not prepared because the great variance in scores would have made them impractical to decipher. The results, however, will be included here in modified Tables VII and VIII.

It is interesting to note that although the failure rate on grip strength was greater for older women than younger women, the failure rates were reversed on leg and back strength.

TABLE III
Flexibility I Hip

Hip Flex Score	Men 20-34	Men 35-up	Women 20-34	Women 35-up	Hip Flex Score
14			100.00		14
13	100.00	100.00	83.33	100.00	13
12	96.55	97.37	77.78	93.33	12*
11	93.10	92.11		80.00	11
10*	89.66	89.47	72.22	66.67	10
9	72.41	86.84	66.67		9
8	55.17	71.05	44.44	60.00	8
7		57.89	33.33	26.67	7
6	48.28	42.11	22.22		6
5	37.93	34.21	16.67		5
4	31.03	23.68			4
3		18.42		6.67	3
2	20.69	15.79			2
1	17.24				1
0	10.34	7.89	5.56		0

TABLE IV

Flexibility II Shoulder

Shoulder Flex	Men 20-34	Men 35-up	Women 20-34	Women 35-up	Shoulder Flex
26			100.00		26
25					25
24					24
23			94.44		23
22	100.00				22
21		100.00	88.89		21
20	93.10				20
19		94.74			19
18	89.47	89.47			18
17	86.21	86.84	83.33	100.00	17
16	79.31	84.21	72.22		16
15	68.97	76.32		80.00	15*
14	65.52	73.68			14
13	55.17	68.42	61.11	73.33	13
12*	48.28	57.89		66.67	12
11	27.59	55.26	50.00		11
10	24.14	44.74	38.89	60.00	10
9		36.84	27.78	40.00	9
8	17.24	26.32		26.67	8
7	13.79	21.05			7
6	6.90	13.16	22.22	20.00	6
5	3.45	5.26	11.11	13.33	5
4			5.56		4
3		2.63			3

TABLE V

Flexibility III Back

Back Flex	Men 20-34	Men 35-up	Women 20-34	Women 35-up	Back Flex
24			100.00		24
23					23
22					22
21					21*
20*			94.44		20
19	100.00		88.89		19
18	96.55	100.00		100.00	18
17	93.10	97.37			17
16	86.21				16
15	75.86		77.78		15
14	68.97	92.11			14
13	65.52	86.84	72.22	86.67	13
12	48.28	76.32	61.11		12
11	37.93	63.16			11
10	27.59	52.63	55.56	80.00	10
9	13.79	34.21	33.33	60.00	9
8	10.34	21.05	16.67	53.33	8
7	6.90	13.16		33.33	7
6		7.89		26.67	6
5		5.26			5
4		2.63		13.33	4
3			5.56		3
2					2
1					1
0	3.45				0

TABLE VI

Strength Per Pound of Body Weight

Strength P/Lb	Men 20-34	Men 35-up	Women 20-34	Women 35-up	Strength P/Lb
9.2	100.00				9.2
8.0		100.00			8.0
7.7		97.37			7.7
7.4		94.74			7.4
7.0		92.11			7.0
6.8	96.55				6.8
6.7	93.10	89.47			6.7
6.6	86.21			100.00	6.6
6.5	82.76	86.84			6.5
6.4*	79.31				6.4
6.3					6.3
6.2	75.86	84.21			6.2
6.1	72.41				6.1
6.0	68.97	73.68			6.0
5.9	65.52	71.05			5.9
5.8					5.8
5.7	55.17	68.42			5.7
5.6	51.72	65.79			5.6
5.5		63.16		93.33	5.5
5.4	37.93				5.4
5.3		52.63			5.3
5.2	34.48	47.37			5.2
5.1		42.11			5.1
5.0		36.84		86.67	5.0
4.9	27.59	34.21	100.00		4.9
4.8		28.95	94.44	80.00	4.8
4.7			88.89		4.7
4.6	24.14				4.6
4.5	20.69	26.32			4.5
4.4		23.68	83.33		4.4
4.3	17.24		72.22	73.33	4.3
4.2		15.79			4.2*
4.1	13.79				4.1
4.0	10.34	13.16	66.67	66.67	4.0
3.9	6.90	7.89		46.67	3.9
3.8		5.26		40.00	3.8
3.7			61.11		3.7
3.6				33.33	3.6
3.5			50.00		3.5
3.4					3.4

TABLE VI (Continued)

Strength P/LB	Men 20-34	Men 35-up	Women 20-34	Women 35-up	Strength P/Lb
3.3	3.45		38.89	26.67	3.3
3.2			22.22		3.2
3.1			16.67		3.1
3.0				20.00	3.0
2.9					2.9
2.8					2.8
2.7				13.33	2.7
2.6				6.67	2.6
2.5					2.5
2.4			11.11		2.4
2.3					2.3
2.2					2.2
2.1			5.56		2.1

TABLE VII
Back, Leg and Grip Strength Scores

	Adult Men			
	Right Grip	Left Grip	Leg St.	Back St.
Desirable for Men	150%	140%	524%	282%
Failures of Men 20-34	86.21%	86.21%	89.66%	20.69%
Failures of Men 35-up	92.11%	92.11%	89.47%	39.47%

TABLE VIII
Back, Leg and Grip Strength Scores

	Adult Women			
	Right Grip	Left Grip	Leg St.	Back St.
Desirable for Women	85%	79%	206%	155%
Failures of Women 20-34	77.78%	83.33%	61.11%	55.56%
Failures of Women 35-up	100.00%	93.33%	53.33%	46.67%

Discussion

It was found through questions pertaining to exercise background, that 68% of the men in the group were involved in some type of conditioning activity, versus only 35% of the women. With this in mind, it could be assumed that men, as a general rule, would show a better fitness level than women. However, as compared to the a priori standards, this was not indicated.

It is interesting that the highest percent of failures were recorded in the areas directly related to the major health problems and complaints in the United States, specifically, cardiovascular endurance and back flexibility, with their relation to heart disease and low back pain. The general results, although showing comparable levels of fitness for all groups, showed a slightly higher fitness level for older women as compared to younger women. A possible explanation follows: In a volunteer group it is more likely that middle-aged persons are better fit than their younger counterparts. The condition of the average person deteriorates after school years because they are less active. Then, for some reason, possibly a good look in the mirror, a decision is made to become active in some type of conditioning program, or to postpone any organized effort to improve the condition. Once the decision has been made to postpone a conditioning program, the commitment is most likely forgotten. If this assumption is correct, then this sample would be characteristic of the motivation factors of the group. This is not to say that this is characteristic of a normal sample, as the norm would include those persons who were not motivated to participate.

Chapter 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

It was the purpose of this report (1) to determine levels of health fitness for a group of faculty, upon enrolling in a faculty fitness class, at Kansas State University; (2) to investigate the levels of desirability as established for the evaluation of the subjects; and (3) to establish norms for the evaluation of the effectiveness of the class on the general condition of the subjects involved.

One-hundred faculty subjects signed up for the fitness class and the testing procedures which were included as part of the class activities. It was assumed that the core of this group consisted of motivated subjects. The subjects were classified into four groups, according to sex and age for analysis of the data. Classifications consisted of men and women groups aged 20-34 and 35-up.

Tests were administered to determine levels of health fitness. These areas were cardiovascular endurance, strength, percent body fat and flexibility. Tests used were a bicycle test for the determination of maximum oxygen uptake; dynamometer test for right and left grip strength, back and leg strength, and strength per pound of body weight; skinfold measurements for determination of body fat; and tests for the determination of hip, shoulder and back flexibility.

Results were analyzed by means of percentile tables compiled for all age groups and for all variables. Statistical analysis revealed that, as would be expected, the groups were in need of remedial training in all areas

with the possible exception of shoulder flexibility for men. The low scoring, as compared to the levels of desirability for women, on the test of percent body fat, and of the total group on back flexibility would suggest that a revision in the a priori standards are necessary. It was also noted that the older women were in as good shape or better than the younger women. Assumptions as to the reasons for oddities are suggested in the body of the report.

CONCLUSIONS

The following conclusions are made based on the data compiled:

1. that emphasis is needed for the development of cardiovascular endurance, especially for men;
2. the chosen standard for percent body fat for women was not of any use as a comparative value;
3. shoulder flexibility is not a major problem for men;
4. the a priori standards established for back flexibility were not useful for data analysis; and
5. in general, all areas of health fitness, for this group were in need of improvement.

RECOMMENDATIONS

The following recommendations are made based on the literature reviewed, statistical analysis, and conclusions:

1. that desirable standards be established not only for sex groups but for age groups in the test of maximum oxygen uptake, flexibility, and strength;
2. that all of the a priori standards be reviewed with special attention to those of body fat for women and back flexibility for men and women;

3. that more faculty members be made aware of the benefits of the fitness class; and

4. that follow-up testing be done using the prepared data for evaluation of the effectiveness of the fitness class.

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APPENDIX A

ADULT FITNESS DATA SHEET

ILLEGIBLE

**THE FOLLOWING
DOCUMENT (S) IS
ILLEGIBLE DUE
TO THE
PRINTING ON
THE ORIGINAL
BEING CUT OFF**

ILLEGIBLE

ADULT FITNESS DATA SHEET

Name _____ Age _____ Ht _____ Wt _____ Sex _____

PERSONAL HISTORY

1. Have you had a recent medical exam? _____
2. Did the exam reveal any physical limitations? _____
If so, elaborate. _____
3. What is your personal physicians name? _____
Name _____ Phone _____
4. What is your past history of exercise?
Recent regular exercise-type _____
Recent occassional exercise-type _____
No current formal exercise _____
Former athlete-Sport _____
5. Do you smoke? _____ How much? _____
How long? _____
6. Do you have any back pains? _____
7. Have you had any heart trouble? _____
Explain. _____

The above information is confidential and will be used solely for research purposes or for prescription of exercise to meet your individual exercise needs.

Date _____

Resting HR _____

Blood Pressure _____ / _____

Bicycle Test KPM _____ HR _____ VO₂ _____

Skinfold AB _____ CH _____ TR _____ % _____

Flexibility Hip _____ Back _____ SH _____

Strength RG _____ LG _____ BACK _____

LEG _____ TOTAL _____ P/lb _____

Date _____

Resting HR _____

Blood Pressure _____ / _____

Bicycle Test KPM _____ HR _____ VO₂ _____

Skinfold AB _____ CH _____ TR _____ % _____

Flexibility Hip _____ Back _____ SH _____

Strength RG _____ LG _____ BACK _____

LEG _____ TOTAL _____ P/lb _____

APPENDIX B

STANDARD DEVIATION AND MEAN

STANDARD DEVIATION & MEAN

	Men 20-34		Men 35-up		Women 20-34		Women 35-up		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Max O2	2.8	0.7	2.7	0.6	2.0	0.6	2.0	0.7	Max O2
% BF	14.4	7.3	12.9	5.2	23.9	5.0	22.3	2.2	% BF
Flex I	6.6	3.9	6.5	3.3	8.8	3.7	8.8	2.6	Flex I
Flex II	13.3	4.5	11.7	4.6	13.0	6.3	10.8	4.2	Flex II
Flex III	12.4	3.8	10.6	3.1	12.3	5.3	9.0	3.8	Flex III
RG	129	18.3	114	22.6	75	13.9	72	6.6	RG
LG	120	18.5	109	18.2	67	14.3	66	8.7	LG
Leg	407	93.3	382	90.4	193	45.2	220	64.7	Leg
Back	330	86.3	307	67.8	160	45.6	157	70.9	Back
SP/lb	5.6	1.2	5.4	1.1	3.7	0.8	4.1	1.1	SP/lb

APPENDIX C

PHYSICAL FITNESS PROFILE FOR MEN AND WOMEN

PHYSICAL FITNESS PROFILE

Adult Men

PERCENTILE	MAX O2	STRENGTH					FLEXIBILITY			% BODY FAT	PERCENTILE	
		RG	LG	BACK	LEG	TOTAL	PER LB	LEG	SHOULDER			TRUNK
100	5.1	176	154	506	748	1499	9.2	13	22	19	3.5	100
95	3.8	152	145	420	540	1207	7.4	11.3	20	17	6.0	95
90	3.5	147	137	396	484	1128	6.7	10.3	19	16	7.5	90
85	3.3	144	132	390	451	1106	6.5	9.5	17	15	8.6	85
80	3.15	141	130	374	450	1071	6.2	9	15.8	13.5	9.5	80
75	3.05	136	126	372	430	1040	6.1	8.5	15.4	12.7	10.1	75
70	3.0	133	120	363	418	1022	5.9	8.2	14	12.4	10.2	70
65	2.9	129	118	352	115	1016	5.8	8	13.5	12	10.5	65
60	2.7	125	116	350	408	996	5.6	7.8	12.8	11.6	11.0	60
55	2.65	124	114	327	405	982	5.5	7.5	12.4	11.2	11.5	55
50	2.60	121	114	325	390	953	5.5	6.8	11.8	10.6	12.5	50
45	2.46	118	113	309	382	940	5.3	6	11.4	10.2	13.5	45
40	2.4	114	111	307	377	918	5.3	5.5	10.8	9.8	14.0	40
35	2.35	108	109	286	370	889	5.1	5	10	9.6	15.9	35
30	2.29	107	103	273	352	860	4.9	4.5	9.3	9.3	16.6	30
25	2.24	106	100	264	335	831	4.6	4	8.6	9	16.8	25
20	2.20	99	98	250	320	788	4.4	3.5	7.8	8.5	18.0	20
15	2.15	97	92	243	290	736	4.2	1.5	6.8	8	21.5	15
10	2.05	95	86	210	275	695	3.9	.9	6.0	7	22.5	10
5	1.90	84	79	172	230	650	3.8	0	5	6	23.1	5

PHYSICAL FITNESS PROFILE

Adult Women

PERCENTILE	MAX O2	STRENGTH					FLEXIBILITY			% BODY FAT	PERCENTILE
		RG	LG	BACK	LEG	TOTAL	PER LB	LEG	SHOULDER	TRUNK	
100	3.5	112	110	360	380	872	6.6	14	26	24	16.0
95	3.2	92.0	84	240	380	722	5.5	13.5	23	20	16.8
90	3.0	86.0	77.5	220	275	633	4.9	13	17	18.8	18.5
85	2.65	81.0	75.0	200	269	603	4.73	12	16.5	15	19.920
80	2.55	79.0	73.0	198	262	586	4.68	11.5	16.2	14	20.5
75	2.4	77.0	71.0	180	250	546	4.38	11	16	13	21.5
70	2.35	76.0	69.0	170	235	539	4.25	10.5	15	12.2	22.0
65	2.27	75.0	67.5	164	220	528	3.99	9.5	13	10	22.0
60	2.0	74.2	66.0	157	210	513	3.96	8.5	12.5	9.9	22.1
55	1.92	73.8	65.0	153	205	508	3.92	8.5	11.8	9.7	22.2
50	1.88	73.5	64.0	150	199	495	3.76	8.0	10.3	9.4	23.0
45	1.82	72.0	63.0	145	194	492	3.62	7.5	9.6	9	23.1
40	1.75	69.8	62.0	140	187	489	3.55	7.4	9.3	8.7	23.2
35	1.62	68.5	60.0	132	170	462	3.38	7.2	9.1	8.3	23.55
30	1.52	67.0	59.0	130	166	442	3.28	7.0	8.8	7.8	24.0
25	1.48	65.6	57.2	125	163	430	3.22	6.7	8.2	7.5	25.0
20	1.40	64.0	56.0	120	160	405	3.12	6.2	7.0	7.1	26.0
15	1.35	63.0	54.0	100	155	390	2.90	6.0	5.5	6	27.0
10	1.20	57.5	53.0	98	150	370	2.70	4.6	4.8	4	30.0
5	1.10	55.9	48.0	79	128	317	2.40	2.0	4.4	3.8	31.0

APPENDIX D

A PRIORI ESTABLISHMENTS

PHYSICAL FITNESS PROFILE

Adult Men

CLASSIFICATION	BICYCLE TEST	STRENGTH					FLEXIBILITY			% BODY FAT	CLASSIFICATION
		RG	LG	BACK	LEG	TOTAL	PER LB	LEG	SHOULDER	TRUNK	
EXCELLENT	4.00+	170	160	316	591	1152	6.97	12	21	24	7%
DESIRABLE	3.80							11	15	22	8%
	3.50	150	140	282	524	1054	6.45	10	12	20	10%
OK	3.30							9	10	16	12%
	3.10	131	124	243	445	939	5.83	8	9	13	14%
MINIMAL	2.60							7	8	9	16%
	2.20	128	115	232	422	906	5.65	6	5	7	18%
POOR	2.10							5	5	6	19%
	2.00-	122	102	215	389	857	5.39	4	4	4	20%+

Adult Women

CLASSIFICATION	BICYCLE TEST	STRENGTH					FLEXIBILITY			% BODY FAT	CLASSIFICATION
		RG	LG	BACK	LEG	TOTAL	PER LB	LEG	SHOULDER	TRUNK	
EXCELLENT	2.80+	98	91	185	314	688	5.47	14	18	25	12%
DESIRABLE	2.60							13	17	23	13%
	2.40	85	79	155	206	525	4.22	12	15	21	14%
OK	2.20							11	12	17	16%
	1.90	77	67	125	142	411	3.91	10	9	14	19%
MINIMAL	1.80							9	7	11	20%
	1.70	56	50	98	119	323	2.66	8	5	8	22%
POOR	1.60							7	4	5	23%
	1.50	48	42	85	97	272	2.35	6	3	3	25%

EVALUATION AND TESTING OF HEALTH
RELATED FITNESS FOR AN ADULT FITNESS CLASS

by

KIRK ANTHONY ROSE .

B. A., Colorado State College, 1969

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

1972

Although evidence exists to show that all aspects of physical fitness are related to the healthful existence of man, there are some areas which are specifically related to his healthful well being. These areas are those of health related fitness, or those areas directly related to hypokinetic disease.

The purposes of this report were to (1) determine levels of health related fitness of a group of faculty enrolled in a faculty fitness class, at Kansas State University; (2) investigate the levels of desirability as established for the evaluation of the subjects; and (3) establish norms for the evaluation of the effectiveness of the class on the general physical fitness of the subjects.

One hundred subjects were tested as to the levels of health fitness they possessed. The class, being all volunteers, provided a sample of motivated subjects. The subjects were classified into four groups, according to sex and age, for the analysis of the data. Areas tested were cardiovascular endurance, strength, percent body fat and flexibility. Tests used were a bicycle test for prediction of maximum oxygen uptake; dynamometer test for strength, skinfold measurement for prediction of body fat; and test of hip, shoulder and back flexibility.

Results were analyzed by means of percentile tables compiled for all variables for all age groups. Analysis revealed, as would be expected, that (1) all groups were in need of remedial conditioning in all areas with the possible exception of shoulder flexibility for men, and (2) that revisions were necessary in some of the a priori standards.