EVALUATION OF THE POUNDS OFF PROGRAM AT ORAL ROBERTS UNIVERSITY

By

TERRY LEE SCHOLLMEIER

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AT ORAL ROBERTS UNIVERSITY

Thesis Approved:

Eric B. Harrison
Thesis Adviser

John G. Bayless

Kelly Albertson

Norman N. Durham
Dean of the Graduate College

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CHAPTER I

INTRODUCTION

Significance of the Study

There are various factors which contribute to one's health and well-being. Statistics related to the causes of death in the United States, suggest that a reasonable level of physical fitness is a requirement in order to survive in a competitively oriented world.[1]

Literature reveals a positive correlation between overweight and the incidence of certain diseases. The number one killer in America, heart disease, counts more of its victims as the weight of each victim increases. This fact becomes obvious from the following statistics which show death rates per 100,000 populace for normal weight people, people 5 to 14% over normal weight, 15 to 24% over normal weight, and 25% or more in excess of normal weight.[2]

(Causes of Death)		OVERWEIGHT		
All Causes	Normal Weight	5-14%	15-24%	25% or more
Number of deaths	844	1027	1215	1472

H. R. Rony, a researcher, explains that a decreased tendency for muscular activity was observed to be a common finding among many obese persons. As weight increases, the impulse for physical exertion decreases. This results in a decreased energy requirement in spite of

the increase in weight, and thus the caloric intake continues to be in excess of need.[3]

Since obesity is a progressive problem per individual, it must be corrected as soon as possible.

Statement of the Problem

Oral Roberts University (ORU) wants their graduates to be mentally alert, spiritually alive, and physically disciplined. Part of being physically disciplined is having a desirable body composition. A maximum of 25% body fat for men is allowed before they are referred to the Pounds Off Program (POP). This program is set up to aid these students in the problems associated with weight control.

After one semester of having over 25% body fat, the men are put on physical probation. If the individual does not correct the problem after another semester, and a physician states there is no physical abnormality causing the obesity, he would be suspended indefinitely from ORU. (See Appendix I for an official ORU statement.)

The purpose of this study was to analyze the effectiveness of the POP on the involved men at ORU during the fall semester of 1976.

Hypothesis

The researcher hypothesized that the subjects, who faithfully watched their diets and worked-out five days per week as the program requires, would lose at least 10 pounds and their body composition would show a decrease in fat composition of at least 3%. Also, the (post) stress test would show a significant improvement in aerobic capacity at

the .05 level of confidence over the (pre) stress test.

Limitations and Delimitations

1. The researcher feels that the biggest weakness of the POP, was the lack of control over the subjects' diet. Even though the program's participants burn off many calories, an improper diet could easily over-ride the calorie deficit. Thus one of the main POP objectives, to lose one pound per week, would never be achieved.
2. The conclusions reached in this research project are limited to the 13 college age men who were in the study.
3. Besides the structured fitness domain of the POP, the subjects were exposed to voluntary group counseling and a voluntary opportunity to have a dietary meal through the ORU Food Service. Diet and counseling are important aspects of a weight reduction program, but since they were voluntary, it was not possible to determine their effects on the subjects.
4. The researcher also feels that, because of the .5 credit status of the POP, the effort put forth by many participants was not substantial enough to result in a positive body composition change. For most obese individuals, a poor physical education grade is an accepted part of their lives.

Definition of Terms

Air Weight--total weight of body mass.

Body Composition--the percentage comparison of lean body weight and body fat-tissue.

Over-weight--according to height and bone structure, a person's body mass is in excess of the recommended allowance.

Over-fat--through body fat analysis, an individual's body fat is in excess of the normal range.

Lean Body Weight--the weight of the lean body mass.

Lean Body Mass--is body weight less the weight of the body fat with the exception of approximately two to five percent of certain essential lipids present in the bone marrow, spinal cord, brain and other organs of the body. Its main content is bone and skeletal muscle.

Body Fat--is equal to the total body weight less the lean body weight.

Body Density--is the body mass or weight per unit volume, which is usually expressed in grams per milliliter.

Aerobic Activity--is exercise which stimulates heart and lung activity for a period of sufficient time to bring about desired organic development.

Aerobic Capacity--the maximum amount of oxygen that the body can process within a given time.

Stress Test--exercise (walk, jog, run) done on a treadmill with an increase in elevation and speed at prescribed intervals, the test is terminated when the subject "feels" he can't go any longer without collapsing.

FOOTNOTES

[1]W. Raab, "Degenerative Heart Disease from Lack of Exercise," Proceedings of the International Symposium on Physical Activity and Cardiovascular Health (Toronto: The Canadian Medical Association Le Journal De L'Association Medicals Canadienne, 1967), pp. 811, 812. ([1]cont.) Laurence E. Moorehouse and Augustus T. Miller, Physiology of Exercise (St. Louis: The C. V. Mosby Co., 1959), p. 249.

[2]L. I. Dublin, A. I. Lotka, and M. Spiegelman, Length of Life (New York: Ronald Press Co., 1949),Table 48, p. 195.

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CHAPTER II

REVIEW OF RELATED LITERATURE

Training

Pollock and colleagues analyzed the effects of training 22 middle aged men at either 80% or 90% of their maximum heart rate. The men ran for approximately 45 minutes twice a week for a period of 20 weeks. The total number of kilocalories expended daily remained constant since the total distance run was equal. Heart rate was taken every 15 minutes during training by means of palpation. The results revealed that both groups significantly increased cardiovascular function, but few changes were noted in spirometry or body composition. The investigators concluded that varying intensity by 80% or 90% maximum heart rate made little difference on the effect of cardiovascular condition when kilocalorie expenditure was held constant. It was agreed that a heart rate threshold of approximately 150 beats per minute provided the necessary stimulus for cardiovascular adaptation.[1]

Dr. Kenneth Cooper states that heart rates must be at 150 beats per minute for a period of five minutes before any circulorespiratory conditioning takes place.[2]

Pollock also compared two groups of sedentary men, one serving as a control, the other participating in a twenty-week vigorous walking program. Training involved 40 minutes walking sessions four days per

week. Significant increases were found in maximal oxygen uptake, pulmonary ventilation, oxygen pulse, and total body weight in the walkers. Maximal and resting heart rate as well as systolic blood pressure did not change.[3]

Harper, Billings, and Mathews grouped 25 college students into a control group and two training groups, according to maximal oxygen uptake scores. One training group participated in a modified army conditioning program of calisthenics and marching; the other underwent a progressive program of interval running. Both training groups conditioned five days per week for seven weeks. The results showed that only the interval running group improved significantly in maximal oxygen uptake, whereas both training groups increased performance on the Harvard Step Test. The authors concluded that the intensity of training appeared to be the dominating factor for improvement in cardiovascular fitness.[4]

In conclusion, the training effect appears to be related to, but not proportional to the intensity of the training bout or degree to which the cardiovascular system is overloaded.[5] The best training combination involves exercises of the highest intensity, frequency, and duration.[6]

Nutrition and Exercise

Using 28 overweight high school girls matched for age, height, and socio-economic status with 28 girls of normal weight, Mayer compared as carefully as possible, their schedules of activity and their caloric intake. Results of the study indicated that overweight girls were found to eat, on the average, several hundred calories less than the

nonobese. But the overweight girls spent only one-third as much time in physical activity.[7]

A similar study, by P. A. Stefanil on adolescent boys, comparing their schedules of activity and their caloric intake, gave similar results.[8]

Diet and exercise are the two primary methods for reducing and maintaining body weight. An obese person must first change his attitudes in order to initiate a change in nutritional and exercise patterns. In most cases, attitudes have allowed the original deterioration. Woodall and Conroy have stated that jogging programs, for the obese subjects in their case studies, appeared to bring about attitude changes (though these changes were not objectively measured) in several areas, primarily areas related to improved self-confidence and self-image.

There is some evidence that the feeding pattern ("meal eating" vs. "nibbling") of the daily energy intake may affect body composition--particularly body-fat content in man and laboratory animals. A study was made over several years on the feeding patterns in (a) a group of subjects with "resistant" obesity (ninety women, 140-198% ideal body-weight, aged 17-69, mean age 31 years; twenty-eight men, 140-198% ideal body-weight, ages 18-57, mean age 37 years) who were referred for failing to respond to diet and drug therapy, and (b) a group of lean, but otherwise healthy, individuals (seventy-four women, aged 18-70 years, mean age 35 years, less than 95% ideal body-weight; fifty-three men, aged 19-65, mean age 37 years, less than 95% ideal body-weight). In the obese group 60% of the women and 54% of the men were found to have a feeding pattern of two meals daily, the larger meal being consumed in the evening or at night, whereas only 16% of the women and 32% of the

men consumed more than three meals daily. In this group of obese subjects 91% of the women and 68% of the men consumed more than 55% of their daily food energy in the form of carbohydrates.[10] In the lean group of subjects, 16% of the women and 6% of the men consumed two meals daily, whereas 70% of the women and 71% of the men had a feeding pattern of four or more meals daily. In the lean group less than 50% of the daily energy was consumed in the form of carbohydrates by 81% of the women and 83% of the men. A history of juvenile-onset obesity was found in 72% of the obese men and 77% of the obese women. Inter-individual differences in mean daily caloric intake were large in both groups of subjects. Some lean individuals consistently consume over 500 kcal. more than some of the obese subjects.[11]

Obese individuals frequently insist they are not hungry, but once food is offered they seem unable to stop eating easily. In many studies these same obese adolescents, or obese young adults have been found to expend 1/6th to 1/3rd the physical energy usually generated by thin people engaged in comparable pursuits, whether this be office work or play on the softball diamond.[12]

Sohar concluded that the relative weight of both obese and non-obese subjects seems to be determined in early infancy and tends to remain constant during childhood, adolescence and usually during adult life. In healthier children the term "relative body-weight" really indicates what percentage of body-weight is made up of fat tissue.[13]

Thus, there is need for combined nutrition education and physical fitness programs in the schools where obese children attend. Christakis has shown that a combined nutrition and physical fitness program had a positive effect on prevalence and degree of obesity concerning high

school boys.[14]

Psychology of Exercise and Obesity

Harris researched why some men choose to be active and others choose to be sedentary. In addition the study attempted to measure changes in attitude towards physical activity in those men who were sedentary but who, during the study, had exercised regularly for one year. The study employed 167 sedentary males, half of who were assigned to a daily exercise program consisting of one hour, three times per week. The remainder of the subjects formed a control group that did not perform any planned exercises. The attitudes of the formerly sedentary men, who were made active by the program, approached those held by men who were voluntarily active. Harris concluded that a program of regular exercise may be introduced into the lives of middle-aged men and produce measureable changes in attitudes toward exercise. The observed changes were primarily with perception of the physiological values of exercise and in the subjects' confidence of being physically capable of adapting to the demands of the physical activity.[15]

Johnson measured and evaluated the change in attitude toward physical activity, strength, general motor ability, associated health and physical education knowledge of obese college freshmen through participation in an adapted physical education program. It was concluded that regular exercise adapted to the obese person's physical capacity and psychological understanding was a sound measure to cope with the problems associated with obesity. Johnson is vague in his definition of exactly what is a sound measure. Also, it was concluded that if the obese individual understood the value of having regular

increments of physical activity in his daily life, it was just as important as the necessity for learning the caloric value of foods.[16]

Johnson further concluded that one way in which the desired changes within the obese individual could be achieved was the motivation of the obese in physical activities. The investigator employed the group approach technique where obese individuals encouraged other obese individuals within their groups into participation in the physical activity. Inactivity, fear, and lack of self-confidence were exchanged for an increased desire for regular increments of physical activity.[17]

On the topic of depression, Morgan et al.[18] and Hellerstein et al.[19] summarized their studies on depression by generalizing that depressed adult males could experience a significant reduction in depression following a period of exercise and that non-depressed males reported they felt better following a similar period of exercise. Morgan, also noted that 85% of his subjects stated they felt better as a result of the exercise studies. He concluded the study with the idea that the depressed state was apparently the antithesis of the "feeling better sensation" reported by subjects following physical exercise programs.

Stunkard believes that physical activity in man is determined by a variety of influences: biological, social and emotional. He concluded that one of the most important and most common of these influences is the series of events associated with a depressive reaction pattern. Depression, according to Stunkard, may not be a purely incidental occurance in obese persons. It may be one of the main reasons why they are obese.[20]

In another study Brunner administered The Adjective Checklist (ACL) to 30 adult males who exercised regularly and 30 sedentary adult males.

The regular exercise group differed significantly from the sedentary group. The results showed that the eight scales of the ACL revealed more extroverted traits among the participants and more introverted traits among the non-participants when intergroup comparisons were made.[21]

Fisher and Cleveland found that whether an individual feels that his body is big or small, attractive or unattractive, strong or weak, may tell us a good deal about his self concept or his typical manner of relating to other people. It has been clearly shown at an experimental level that an individual's perception of his body size may affect the nature of his attitude toward himself and his body.[22]

It can be concluded that a proper interaction of various components form the personality. Inadequate physical activity, by creating emotional imbalance and tension through curtailment of outlets, may be a direct factor in impairing emotional and mental health.[23]

Summarizing the related literature; the best training combination involves exercises of the highest intensity, frequency, and duration. Overweight boys have more of a problem with limited exercise habits than with an excessive caloric intake. Psychologically, an increased fitness level associated with an improving body composition, can improve one's self confidence and self-image.

FOOTNOTES

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[3]Michael L. Pollock et al., "Effects of Walking on Body Composition and Cardiovascular Function of Middle Aged Men," Journal of Applied Physic., Volume 30, January, 1972, pp. 126-130.

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[15]Dorothy V. Harris, "Physical Activity History and Attitudes of Middle-Aged Men," Medicine and Science in Sports, Vol. 2, Winter, 1970, pp. 203-208.

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[18]William P. Morgan, John A. Roberts, Frank R. Brand, and Adrian D. Feinerman, "Psychological Effect of Chronic Physical Activity," Medicine and Science in Sports, Vol. 2, 1970, pp. 213-217.

[19]Herman K. Hellerstein, T. R. Hornsten, Alverto N. Goldbarg, A. Burlando, E. Freidman, and E. Hirsch, "The Influence of Active Conditioning upon Subjects with Coronary Artery Disease," Proceedings of the International Symposium on Physical Activity and Cardiovascular Health, Vol. 14 (Toronto: Canadian Medical Association, March 25, 1967).

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[21]B. C. Brunner, "Personality and Motivating Factors Influencing Adult Participation in Vigorous Physical Activity," Research Quarterly, Vol. 40, October, 1969, p. 464.

[22]L. J. Stone, ed., The Body Percept, New York: Random House, 1965, p. 48 and 51.

[23]Hans Kraus and Wilhelm Raab, Hypokinetic Disease, Springfield: Thomas, 1961, p. 151.

CHAPTER III

METHODS AND PROCEDURES

Source of Data

The subjects studied for this paper were selected from the required physical education classes at Oral Roberts University. During the first week of class (Sept. 1-5, 1976), all students were tested on their body composition by the Pollock method of skinfolding.[1] Each student was measured by a skinfold caliper at seven sites: triceps, subscapular, suprailiac, chest, axilla, abdomen, and thigh. The sum of these measurements was compared to charts which indicated the percent fat. Women of 35% body fat and over, and men of 25% body fat and over were referred to the Pounds Off Program. Thirteen men were over 25% fat, and therefore qualified for the sixteen week program, with required attendance, or until their body composition was acceptable.

Collection of Data

Tests administered to the POP participants at the beginning and end of the semester consisted of: spirometry test to measure vital capacity and residual volume, hydrostatic weighing, anthropometric and skinfold measures to determine percent body fat, treadmill test and Cooper's 1.5 mile run to determine cardiovascular fitness.

The subjects were tested in the morning, after being previously

instructed: not to eat 12 hours before the test, no vigorous activity for 24 hours before the test, obtain at least five hours of sleep the night prior to the testing and should not have donated blood within five weeks previous to the tests. On arrival at the ORU laboratory the subjects filled out a diet, activity, and health summary questionnaire prior to administration of any of the tests.

Spirometry

Three pulmonary functions were measured on the Ohio Medical Spirometer Model 842 for calculation of vital capacity (VC), the Forced Vital Capacity (FVC), Forced Expiratory Volumes for 1 second ($FEV_{1.0}$), and for 3 seconds ($FEV_{3.0}$). The subject, while standing, inhaled maximally and then exhaled into the spirometer as fast, forcefully, and completely as possible. Three trials were given, and the largest volume was recorded.

The second test administered on the Ohio 842 Spirometer was a test for residual volume.[2]

Height

The subject was measured barefoot, standing with his heels against the wall. Both the heel and the ball of both feet were in contact with the floor, and the subject was instructed to attain his greatest height by inhaling deeply. Height was recorded in centimeters.

Weight

The subject was attired in a dry bathing suit and weighed on a chair scale. Weight was recorded in pounds and kilograms.

Anthropometric and Skinfold Measures

The subject was skinfold tested by the Pollock method. The skinfold caliper was applied to the fold about a centimeter below the fingers. Two to three trials were taken to obtain a consistent reading.[3]

Hydrostatic Weighing

The subject wearing a bathing suit was weighed underwater in a sitting position on a chair suspended from a scale. The subject was instructed to exhale all of the air from his lungs and then hold his breath for a couple of seconds, during which time the lab technician obtained a weight measurement from the scale. Six to eight trials were taken, and the heaviest consistent weight was recorded as the subject's underwater weight. In calculating body density from hydrostatic weighing, a calculated residual volume of each individual was needed. Body density was calculated by the following formula:

$$BD = \frac{Wgt._{air}}{[Wgt._{air} - (Wgt._{H_2O} \cdot \frac{RV\ 100)}{D_{H_2O}}]} \cdot \Big/ \ D_{H_2O}$$

$$\% \text{ Fat} = \left(\frac{4.570}{BD} - 4.142 \right) \times 100$$

BD = body density

$Wgt._{air}$ = subject's weight in air (kilograms)

$Wgt._{H_2O}$ = subject's weight in water (kilograms)

RV = subject's residual volume of air (liters)

D_{H_2O} = density of water at time of trial.[4]

Stress Test

The subjects were given an exercise test on the treadmill according to the Bruce protocol (Table 1). At the start of the test the subject walked on a 10% incline at a 1.7 M.P.H. rate of speed. At three minute intervals the speed and incline were increased slightly. Gradually the subject was worked up to a fast jog. The termination of the test was self-determined when the subject felt he had reached exhaustion (this was signaled when the subject grasped the front bar on the treadmill).

During the entire test the heart was monitored by electro-cardiogram. The sites of electrode placement were: the right and left subclavicular fossa between the deltoid and the pectoralis major muscles; the fifth intercostal space on the left midaxillary line; the lower lumbar region of the back, approximately one and one half to two inches on either side of the spinal cord.

A resting EKG tracing was recorded prior to the test. During the treadmill test the heart rate was monitored on the electro-cardiograph by the V_5 lead and was recorded in the last 15 seconds of each minute. The heart rate was monitored for a five minute recovery period immediately following the test termination. A complete seven lead EKG tracing was recorded for the first, third, and fifth minutes of recovery. Blood pressure was also monitored during the entire test. If any irregularities in blood pressure or on the EKG read-out were noticed by the lab technician, the stress test was immediately terminated. The irregularities were then referred to a cardiac-specialist.

TABLE I

THE BRUCE PROTOCOL

Stage	Time	Treadmill Speed	Treadmill Incline
I	0-3:00 min.	1.7 mph.	10%
II	3-6:00	2.5	12%
III	6-9:00	3.4	14%
IV	9-12:00	4.2	16%
V	12-15:00	5.0	18%
VI	15-18:00	5.5	20%
VII	18-21:00	6.0	22%
VIII	21-25:00	6.5	24%

Field Test

The male subjects were tested on a one and one half mile run during the first six weeks and the last three weeks of the semester. On the ORU indoor jogging track, the field test consisted of nine and three quarters laps. If their best time was less than 10:05, they achieved full potential toward their final POP grade (10% of final grade).

Exercise Program

The subjects were scheduled on a 5-day a week aerobic exercise period. Arrangements were made with the instructors to meet at 9:50 a.m., 3:10, 4:10, or 5:10 p.m. If they were unable to meet daily at these times, the students were to work out their own time and report their progress back to the instructor. The students were also required to obtain 30 aerobic points per week with at least 12 of those points coming from walking, jogging, cycling or swimming.

It was suggested that the students begin their exercise period for the day with at least a mile jog, recording their heart rates and running time at the end of the run. The students were encouraged to gradually increase their mileage while decreasing their running time and maintaining a heart rate that would induce a training effect (refer to chapter two of this research paper within footnotes one and two).

Stationary cycling was suggested as the next activity while the heart rate was still at a high rate. A minimum of 120 heart beats a minute was set for obtaining aerobic benefit from cycling. Five minutes was the suggested time block with a gradual increase in time and pedal tension.

Cycling was followed by a series of exercises as a base for the individual's exercise program: bent knee sit-ups (10); tricep extensions (20 pounds, 10 repetitions); curls (20 pounds, 10 repetitions); knee squats (20 pounds, 10 repetitions); leg press (110 pounds, 10 repetitions); bench press (30 pounds, 10 repetitions); lat pulls (30 pounds, 20 repetitions). All exercises were to start out with low weights and repetitions with a gradual build up on weights and repetitions. The researcher continued to remind the POP men that muscle bulk is not needed for functional fitness (a capacity essential to health and well being).[5]

Diet

Diet control for the students was strictly voluntary. The Food Service of ORU offered a diet meal plan for a short time, but because of poor response the line was discontinued. The instructors offered advice, handouts on caloric intake and proper eating habits for weight reduction, and encouragement. Actual monitoring of an individual's caloric intake or expenditure was not implemented. Any other aspect of diet control was left up to the individual.

Behavior Modification

A series of group or private counseling sessions were offered for behavior modification by Ms. Carol Ruddick of the ORU counseling center. Ms. Ruddick was involved in the POP and offered her services on a voluntary basis. This service was also discontinued because of the lack of attendance. The researcher knows of no POP men that attended any of the counseling sessions. The fact that the counselor

was a woman possibly influenced their absence from the counseling sessions.

Analysis of Data

(Pre) and (post) mean changes of hydrostatic weighing, skinfold measures, air weight, Bruce treadmill test and Cooper's 1.5 mile run were put through a "t" test at the .05 level of confidence.

A correlation was computed between all six selected measures: aerobic points, field test difference, Bruce test difference, weight difference, Pollock test difference, hydrostatic test change.

All of the above data was processed for statistical analysis at the ORU computer center.

FOOTNOTES

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CHAPTER IV

ANALYSIS AND DISCUSSION OF RESULTS

Organization of the Data for Analysis

The purpose of this study was to analyze the effectiveness of the Pounds Off Program of the involved men at the Oral Roberts University. The parameters that were measured and analyzed were the percent body fat by hydrostatic weighing method and the Pollock's skinfold method, the subject's air weight, the Bruce treadmill test, and the one and one-half mile field test. Each of the subjects were tested once before and after the POP in all the stated paremeters.

Table II reveals the mean changes between the "pre" and "post" tests. It also lists the "t" ratio comparing T_1 and T_2. A "t" ratio of 1.73 was needed to achieve a significant difference at the .05 level of confidence.

Table II lists the correlation between selected measures.

Analysis and Discussion of Results

The data of Table II reveal that only the Bruce test surmounted the .05 level of confidence. The subjects' average time on the treadmill increased almost one and one-half minutes from 9.48 to 11.04 minutes. This confirmed the researcher's stated hypothesis that the subjects would improve on their "post" stress test because of the POP training.

TABLE II

MEAN CHANGES FROM TEST I TO TEST II

	T_1		T_2				
	X	N	X	N	Change	df	t*
% Fat Hydrostatic	28.86 ± 5.42	(12)	26.27 ± 5.88	(11)	-2.39	21	1.10
% Fat Pollock	25.02 ± 6.68	(11)	22.48 ± 7.35	(9)	-2.54	18	.41
Air Weight	219.92 ± 22.81	(13)	215.08 ± 25.26	(13)	-4.85	24	.51
Bruce Test	9.48 ± 2.11	(12)	11.04 ± 1.08	(10)	+1.37	20	2.11*
Field Test	13.70 ± 2.68	(13)	12.70 ± 2.43	(13)	- .68	24	1.00

*t .05 (18) = 1.73 for significance.

Thus, it can be concluded that the POP developed the subject's cardio-vascular endurance. A related improvement in the field test of 13.7 to 12.7 minutes was also recorded, but the "t" ratio did not reach the .05 level of confidence ("t" - .41 and .51). In the Pollock skin-fold there was a change of 2.54% fat, from 25.02 down to 22.48% fat average. This fell short of the POP objective which sought 4-5% fat change after the 16 weeks of the class. The recorded weight change average of 4.85 pounds from 219.92 to 215.08 pounds, also fell quite short of the POP objective to lose 16 pounds for the 16 weeks of class. The previous short-comings implied that the POP participants needed more guidance in weight control by diet.

The percent fat change by hydrostatic weighing showed the 2nd highest "t" ratio ("t" = 1.10), though it did not reach the .05 level of confidence. The hydrostatic weighing, being a valid test if given by a trained testor, showed an interesting parallel of being 4% higher than the estimated percent fat by the Pollock skin-fold method. Thus, both the hydrostatic weighing and the Pollock skin-fold change fell 2-3% short of the desired POP objectives which sought a 4-5% fat loss over the 16 week period.

The data of Table II suggest that even though the participants did not achieve a caloric deficit and fat percent loss desired by the stated POP objectives, many participants did experience a cardio-vascular improvement which showed up on the "post" Bruce test.

The analysis of Table III showed: a good correlation between the field test change and the hydrostatic test change (.71), weight change and hydrostatic test change (.71); a fair correlation between the field test change and the weight change (.69), field test change and the

TABLE III

CORRELATION BETWEEN SELECTED MEASURES

Variables	r
Aerobic Pt. Avg. and Field Test Change	+.28
Aerobic Pt. Avg. and Bruce Test Change	+.63
Aerobic Pt. Avg. and Weight Change	+.06
Aerobic Pt. Avg. and Pollock Test Change	+.20
Aerobic Pt. Avg. and Hydro. Test Change	+.13
Field Test Change and Bruce Test Change	+.36
Field Test Change and Weight Change	+.69
Field Test Change and Pollock Test Change	+.68
Field Test Change and Hydro. Test Change	+.71
Bruce Test Change and Weight Change	+.17
Bruce Test Change and Pollock Test Change	+.31
Bruce Test Change and Hydro. Test Change	+.03
Weight Change and Pollock Test Change	+.53
Weight Change and Hydro. Test Change	+.71

Pollock test change (.68), aerobic points and the Bruce test change (.63); and a statistically significant correlation between the weight change and the Pollock test change (.53). The remaining eight correlations were not statistically significant.

One can surmise that a decrease in percent fat as recorded through hydrostatic weighing was accompanied by developing muscle mass. As the percent fat decreased, there were probably psychological as well as physical reasons for the field test improvement.

The second good correlation showed change in body fat composition to be related to a change in weight. Once again, it could be deduced that the POP training caused a development of muscle mass; but a corresponding amount of weight loss was not recorded. The researcher felt that this indicated a lack of dietetic control through the POP, resulting in an insignificant caloric deficit.

Most interesting to the researcher of the nonsignificant correlations was that between aerobic points and weight change. The researcher felt that the low correlation could have been caused by the fact that scientifically calculated (monitored oxygen consumption), aerobic points were not obtained, meaning that the subjects rarely worked hard enough to achieve a training effect. The training needed for aerobic points to be earned by this age level is further expounded in chapter two of this research paper in footnotes one and two.

The researcher hypothesizes that the poor correlation between the Bruce test and the field test was due to the fact that three of the slower participants did not take the second Bruce test, but they did take the field test. This same hypothesis could also explain the surprisingly poor "t" ratio of the field test ("t" = 1.00) compared to

the Bruce test ("t" = 2.11).

The researcher concluded from the preceding data that there are possibly two significant ways of improving the POP, thus in turn obtaining more of the stated objectives. The POP should put more emphasis on mandatory nutritional diet instruction, and/or increase and POP's training agenda to increase caloric expenditure to a sizable extent.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to analyze the effectiveness of the Pounds Off Program on the thirteen involved men at Oral Roberts University. The objectives of the POP as stated by the Health and Physical Education Department of ORU were: lose 1 pound per week for a total of 16 weeks of the class, lose 1 percent fat every 3 weeks for a total of 4-5 percent fat after 16 weeks of the class, earn at least 24 or 30 aerobic points (women or men) per week with a minimum of 12 points coming from cycling, swimming, walking, or jogging.

The measured parameters were described in Chapter III of this study. The researcher hypothesized that the subjects who took the POP seriously; in other words they faithfully watched their diets and worked-out five days per week as the program requires, would lose at least 10 pounds and their body composition would show a decrease in fat composition of at least 3%. Also, the (post) stress test would show a significant improvement in aerobic capacity at the .05 level of confidence over the (pre) stress test.

The achieved portion of the hypothesis, being the increased Bruce Test time, was the only parameter that surmounted the .05 level of confidence. The researcher felt that the subjects did not lose 10

pounds or decrease 3% in fat composition because the POP had very little influence or control of the subjects' diets.

Conclusions

As a result of analyzing the data gained from the POP, the researcher came to the following conclusions:

1. The POP improved cardiovascular fitness as measured by the Bruce treadmill test; and therefore, the hypothesis is accepted in this regard.
2. The POP subjects on the average did not individually lose 10 pounds or decrease 3 percent in fat composition. Thus, this portion of the hypothesis is rejected.

Recommendations

Future POP's should increase the dietetic control and/or increase the training program to insure a caloric deficit. Dietetic control would include hand-outs, selected seminars, and a possible diet line provided by the ORU Food Service.

The researcher acknowledges the need for more research to be done on future POP's of ORU. As continued research is done, and the analysis of this research is implemented into the POP, the effectiveness of the program will increase accordingly.

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APPENDIX

ORU's Pounds-Off Program

An explanation as to what, why, and how the physical fitness program works at Oral Roberts University

ORU's founding purpose calls for a "life-style with an education." We are primarily concerned with developing life-styles at ORU--life-styles which emphasize wholeness in body, mind, and spirit. We seek equal development in each area: physical fitness for the body, development of the mind through a vast exposure to new ideas and top-quality professors, and also growth for the spirit. We believe God created man whole and that Jesus' greatest desire was to make man whole again. We know that a quest for wholeness takes a great deal of discipline, but we believe strongly in the result: reaching more of our potential as human beings! The entire concept of wholeness is the foundation at ORU. It is part of our Code of Honor pledge, which each student signs as a part of the admissions process to ORU. It is our goal.

Now, in practical terms, when a student applies to ORU, he or she agrees to the whole-person concept. No student is denied admission simply because he is overweight although the excessively overweight student may be asked to begin a weight-loss program before registration. Once a student is admitted, he is given a series of academic tests (to determine if he must take certain prerequisite courses) and a series of physical tests (which are very extensive and which include tests of the heart, lungs, blood vessels, body composition, etc.) We want to know what our students are capable of doing and where they are in reaching their potential. The students also seem eager to find out!

If in testing a student physically we find that he falls into an overweight classification (more than 35% body fat for women, 25% body fat for men--the normal range is 20-25% for women, 10-15% for men)--then the student is advised of several things:

1) He is informed of the dangers to health of being overweight, and there are many.

2) He is given special courses and information which explain how we become overweight, how to lose weight, along with facts about nutrition, exercise, and disease.

3) He is given a recommended personal goal weight range and asked to agree with the University to lose his excess weight over a period of time (which is decided in cooperation with a campus physician.)

4) The University helps and encourages the student in his weight-loss program--through counseling, small-group discussions, and special exercise programs--which are voluntary.

We do not simply look at a student and say, "Hey, you're fat. Lose or else." And we don't say, "You're so tall so you must weigh so much." We look at each student individually and try to help him to have more energy, better health, and less susceptibility to disease.

If a student has a metabolism problem which makes losing weight difficult, that is taken into consideration and special programs are available to help that person become physically fit. If a student is overweight because it is hard for him to control his eating habits or he doesn't know enough about nutrition, then we try to provide outlets for learning self-control, rechanneling energy, and learning about food values. Our goal is to help every student become healthy and strong.

Should a student willfully choose to remain overweight or not meet other requirements of his physical education course, he is subject to probation--in the same way that a student who willfully decides to ignore class or chapel or to fail his academic courses is subject to probation. We are very concerned with the whole life-style and place equal emphasis on each area.

To our knowledge, no student has been suspended midyear for being overweight. If a student failed several courses after being on academic probation for a semester, the University would ask that student to make up these courses before reenrolling the following year. In that same manner, a student on physical probation who continues to ignore exercise and a weight-loss program may be asked to take a semester to build up his level of physical fitness before reenrolling at ORU.

Again, our concern is with a life-style that will help students be healthier, stronger, more alive, more aware of our world, and most of all, better able to help other people. Being physically fit is a part of being whole, and maintaining a proper weight range is a part of being physically fit.

As for the action taken by the American Civil Liberties Union as reported nationwide, ORU to date has not been contacted directly by the ACLU or the Office of Health, Education, and Welfare, or been given a full statement from them as to the nature of their complaint or any subsequent action.

AEROBICS PROGRAM SUMMARY
1976-77
ORAL ROBERTS UNIVERSITY

I. Aerobics Points (based on 3000 full-time students and faculty)

1,500,000	from	289,135	miles jogged
450,000	from	50,000	hours of basketball
180,000	from	20,000	hours of racketball
110,000	from	19,000	hours of calisthenics
90,000	from	6,000	hours of rope skipping and rhythmic aerobics
80,000	from	10,000	hours of stationary cycling
70,000	from	11,000	hours of touch football
60,000	from	20,000	hours of tennis-badminton
50,000	from	18,764	miles cycled
48,000	from	2,323	miles swum
45,000	from	3,000	hours of stationary running
40,000	from	10,000	hours of softball
40,000	from	10,000	hours of volleyball
32,000	from	4,000	hours of skating and skiing
20,000	from	2,500	hours of soccer
20,000	from	5,000	hours of gymnastics
7,000	from	800	hours of combatives
2,000	from	1,800	hours of golf

2,914,000 Total Points*
September 15, 1976 - April 21, 1977

II. Individual Performances

A. Jogging Clubs

1. 100 miles club
   810 men
   505 women
   1315 Total

2. 500 miles club
   22 men
   6 women
   28 Total

3. 1000 miles club
   8 men

4. 2000 miles club
   2 men

B. Cycling Clubs

1. 200 mile club
   34 men
   12 women
   46 Total

2. 500 mile club
   3 men

C. Swimming Club

1. 50 mile club
   14 men
   7 women
   21 Total

2. 100 mile club
   4 men

III. Average Aerobics points earned per person per week = 36.72

IV. Field Test Times Results, Fall, 1976

	Men (1.50 miles)		Women (1.35 miles)	
	$\bar{X}$	SD	$\bar{X}$	SD
Freshman	10.05	1.31	11.67	1.46
Sophomore	10.38	1.22	11.73	1.39
Junior	10.27	1.23	11.75	1.22
Senior	10.16	1.04	11.81	1.32
Average	10.17	1.24	11.67	1.37

93% of the men completed the test under 12:00
59% of the women completed the test under 12:00

V. Since the opening of the Aerobics Center in August, 1974, 730,000 miles have been jogged on the track. In the 1977-78 year (4th year in the Aerobics Center) the total will go over 1,000,000 miles. We would like a picture of President and Mrs. Roberts and Dr. and Mrs. Ken Cooper jogging the millionth mile together.

VI. The Human Performance Laboratory is now engaged in numerous short-term and long-term research projects. Five were completed this past year and will be prepared for publication this summer.

VII. The Aerobics Major is now in full swing with 20 majors. The first 5 will graduate in the spring of 1978.

New Aerobics by Kenneth Cooper

page 33:

For 1157 Austrian males in the Austrian Army, average age 19, 75.3% ran the field test in under 12 minutes.

1380 American males in the United States Air Force, average age 19, 59.1% ran the test in under 12 minutes.

93% of the Oral Roberts University men ran the test in under 12 minutes.

VITA

Terry Lee Schollmeier

Candidate for the Degree of

Master of Science

Thesis: EVALUATION OF THE POUNDS OFF PROGRAM AT ORAL ROBERTS UNIVERSITY

Major Field: Health, Physical Education and Recreation

Biographical:

Personal Data: Born in Arcadia, Wisconsin, July 30, 1954, the son of Mr. and Mrs. Jerome A. Schollmeier.

Education: Graduation from Arcadia High School, Arcadia, Wisconsin, in May, 1972; received Associate of Arts degree in Physical Education from Waldorf Junior College, Forest City, Iowa; received Bachelor of Science degree in Health and Physical Education from Oral Roberts University, Tulsa, Oklahoma, in May, 1976; completed requirements for the Master of Science degree at Oklahoma State University in May, 1978.

Professional Experience: Graduate teaching assistant, Oral Roberts University, 1976-1978.