

Measuring Changes in Health-related Fitness Status and Attitude as a Result of a One-semester College Health-fitness Course

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ABSTRACT

The main purpose of the present study was to determine if health-related fitness, and attitude could be improved as a result of one semester college health-fitness course. Fitness was measured by sit-up test, jump on bench test, sit and reach test, standing long jump test, and jump rope as a measure of cardiovascular endurance. Attitude was measured by Keñyon six scales for assessing attitude toward exercise and physical activity. The health-fitness classes met three times per week for a session of 45 minutes each. All the classes used the same tests and followed the same course requirements. The results indicated that all groups significantly improved at 0.05 level of confidence in fitness and attitude, and that fitness and attitude can be improved in female college students in Bahrain as a result of a well-organized health-fitness course to the same degree regardless of the specific methodology employed.

The job of increasing health awareness, decreasing health risk and creating health behavioral changes for youth in the state of Bahrain represents an important subject and concern for research and investigation. Health-related physical fitness is concerned with the development of those qualities that offer protection against disease and frequently are associated with physical activity¹.

Physical activity is essential for optimal health for all ages, the lack of proper physical activity has often been cited as a major contributing factor to obesity, heart disease, diabetes, stress and hypertension².

When undertaking an exercise programme care should be taken to develop a programme relative to

physiological principles. One of the major principles to be considered is that of specificity. Specificity refers to the concept that what a person gains or develops from exercise is specific to the type of exercise performed³. There are five categories of health-related fitness components which develop specific to a given form of exercise: muscular endurance, muscular strength, cardiovascular endurance, flexibility, and body composition (some overlap in training is likely to occur). Recent research indicates that health-related fitness is important for everyone⁴.

It was found, as a result of a study⁵ run at University College of Bahrain, that female college students at University of Bahrain (UCB) had misconceptions towards physical activity (negative attitude). This is attributed to the fact that many of the women in the Arabian Gulf area have never been exposed to the essential principles of fitness and cardiovascular health. In another study⁶ the researcher found that the Bahraini female college students' cardiovascular endurance was less than the Egyptian and the American female college students as well as their resting heart rate before and after exercise. The American mean score for the twelve minute run and walk test was 2941.168 (metre), the Egyptian mean score was 2435.509 and the Bahraini mean score was 1944.079 after exercise for 16 weeks two times a week, while f equalled 3.25 with an alpha level of 0.05, and df equal 14. For the resting heart rate the American mean score was 70.267 (beats/min), the Egyptian mean score was 83.267, and the Bahraini mean score was 94 (beats/min), while f equalled 6.725 with an alpha level f 0.05 and df equalled 14.

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The major focus of the present study was to determine if health-related fitness status and attitude of female students in University of Bahrain towards physical activity could be improved as a result of a one semester college health-fitness course.

METHODS

Selection of subjects

A total of sixty eight female college students enrolled in health-fitness classes at UCB from 19 to 22 years of age were used as subjects in the study for the fall term, and spring term of the 1986-87 academic school year, 34 students were assigned for each term (g.1, g.2). All subjects were free of any kind of disease or handicaps.

Data collection procedures

Training programme was conducted at University of Bahrain for the fall term and spring term of the

1986-87 academic school year. Subjects were tested before the programme and 14 weeks after the programme.

The training programme was identical and consisted of 10 minutes warm-up, 18 minutes aerobic routine, and 12 minutes circuit training contains the following exercise: muscular strength exercises, muscular endurance exercises, cardiovascular endurance exercises, and flexibility exercises, the last 5 minutes were cool-down and relaxing exercise. (Appendix I, II).

The exercise intensity for the aerobic dance routine were prescribed at 70% and 85% of maximum heart rate. Resting heart rate, maximum heart rate, and blood pressure were measured. Appendix III shows the theories lectured during the semester for the classes (Introduction to Sport Activities, PHED 051, University of Bahrain).

APPENDIX I

Health-related Fitness Programme used in the study:

Warm-up (5-10 minutes)

1. Wrist circles, shoulders rotation, arms rotation, bend front, waist twist, head circles, shoulders lift, side bend, lounge right and left, tip toes, spinal roll.
2. Ankle flexibility, feet stretch, feet circles, straddle stretches right and left (lower leg hold), half time sit-ups, pelvic tilt, pelvic tilt with twist, knee press, shaking legs.

Exercise

1. Aerobic routine (18 minutes)
2. Circuit training contains the following exercise (12 minutes):
 - a. muscular strength and endurance:
sit-ups, tie tucks, push-ups, squat thrusts, jumping on bench, chin-ups, pull-ups.
 - b. cardiovascular endurance:
running in place, jumping rope, Harvard step test, jumping on mini trampoline, twelve-minute run and walk, and bicycling (ergometer).
 - c. flexibility:
sit and reach, stretch sides, bridge and push, front split, Chinese split, sit and twist, wall stretching.
3. Cool-down (5 minutes)

APPENDIX II
Distribution of the Activity

<i>Week Number</i>	<i>Activities</i>
1	Pre-tests: RHR, MHR, blood pressure, fitness tests, attitude test, and body weight.
2-5	Warm up + aerobic + circuit training in 8 stations, each station lasts approximately one minute with a 30 second rest between each station (sit-up, push-up, squat thrust, jump rope, jumping on mini-trampoline, bicycle ergometer, stretch sides, bridge and push).
6-9	Warm up + aerobic + circuit training in stations, each station lasts approximately one and a half minutes with a one minute rest between each station (tie-tuck, jump on bench, run in place, step on bench, bicycling, front split, sit and twist, sit reach forward)
10-14	Warm up + aerobic + circuit training in stations, each station lasts approximately two minutes with a two minutes rest between each station (sit-up, squat thrust, jump on bench, push-up, run in place, step on bench, bicycling, stretch sides)
	Post-tests: RHR, MHR, blood pressure, fitness tests, attitude test, and body weight.

APPENDIX III

Theories Lectured for the Classes
Introduction to Sport Activities
(PHED 051, University of Bahrain)

1. Physical fitness definition.
2. Physical fitness components.
3. Physical and psychological benefits of conditioning programme.
4. Effects of exercise (purpose of warm-up, strength, muscular endurance, flexibility).
5. How to compute heart-rates (resting HR, working HR, maximum HR, and recovery HR).

6. Requirements for an effective exercise programme.
7. Exercises which may be harmful to the body, training tips.
8. Self-instructional fitness exercises list, guidelines for setting up a total programme.
9. Energy expenditure in various activities.
10. Physical activity and health-fitness exercise.
11. Aerobic exercise through dance (intensity – frequency, duration).
12. Special related topics (posture, relaxation, weight control, weight reduction, etc.).

Selection of instruments

1. For measuring changes in health-related fitness status the following tests were used:
 - a. sit-up test as a measure of back and abdominal muscular strength and endurance.
 - b. jump on bench as a measure of legs muscular strength and endurance.
 - c. jump rope as a measure of cardiovascular endurance.
 - d. sit and reach test as a measure of flexibility.
2. Changes in attitude were measured by the Kenyon's six scales⁷ for assessing attitude toward

TABLE I
Means, Standard Deviations, and Standard Error of the Means for the Two Groups (Age, Weight, and Height)

	Group 1 (1986)		Group 2 (1987)		Mean Diff	t value
Age	\bar{X}	19		18.882	0.118	-0.643
	S.D.	1.107		0.769		
	SE					
	\bar{X}					
Weight	\bar{X}	52.97		51.7	1.27	-0.542
	S.D.	9.213		9.782		
	SE	1.58		1.78		
	\bar{X}					
Height	\bar{X}	158.294		158.191	0.103	0.073
	S.D.	5.419		5.967		
	SE	0.929		1.023		
	\bar{X}					

TABLE II
Means, Standard Deviations, Standard Error of the Means,
and t Value for the Two Groups

Variables	Fall Semester			mean diff	t value	Spring Semester		t diff	value
	pre	post				pre	post		
Muscular Endurance (#/min)	\bar{X}	19.382	39.206	19.82		20.941	39.358	18.417	**
	S.D.	7.544	7.702		-10.563*	9.115	5.985		-12.469
	SE	1.293	1.321			1.563	1.026		
	\bar{X}								
Muscular Strength (#/min)	\bar{X}	23.206	34.294	11.088		19.912	33.824	13.9128	**
	S.D.	6.485	8.604		-5.930	6.529	8.376		-9.859
	SE	1.11	1.475			1.119	1.436		
	\bar{X}								
Cardio-vascular Endurance (points)	\bar{X}	10.216	23.989	13.77		9.788	24.062	14.274	**
	S.D.	4.122	9.583		-8.201*	4.434	9.017		-9.966
	SE	0.707	1.643			0.760	1.55		
	\bar{X}								
Flexibility (cm)	\bar{X}	31.059	37.132	6.07		32.426	39.417	6.991	**
	S.D.	7.59	6.044		-6.675*	6.747	4.975		-5.285
	SE	1.301	1.036			1.151	0.853		
	\bar{X}								

** significant at $\alpha = 0.05$, $t = 2.042$, $n_1 = 34$, $n_2 = 34$, $df = 33$

* Aerobic point = $[(0.005 \times \text{steps/min}) - 0.1] \times \text{duration}$ for less than 10 minutes

TABLE III
Means, Standard Deviations, Standard Error
of the Means and t Values for the Attitude Test

Variables		pre-test	post-test	mean diff	t value
Group 1 (n=34)	\bar{X}	138.058	242.647	-108.589	-5.467 *
	S.D.	74.024	60.647		
	SE	12.76	10.456		
	\bar{X}				
Group 2 (n=34)	\bar{X}	146.941	302.117	-155.176	-15.351 *
	S.D.	58.176	27.371		
	SE	10.03	4.719		
	\bar{X}				

* Significant at $\alpha = 0.05$, $t = 2.042$, $df = 33$

TABLE IV
Internal Consistency and Reliability of the Kenyon's
Six Scales for Assessing Attitude Towards Exercise
and Physical Activity

<i>Variables</i>	<i>Reliability (r)</i>
1. Health and fitness experience	0.83
2. Aesthetic experience	0.87
3. Social experience	0.72
4. Pursuit or vertigo	0.86
5. Catharsis	0.79
6. Ascetic experience	0.78
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Total Reliability (split half)	0.91
Internal Consistency Total	0.72

exercise and physical activity. The test was modified to be suitable for the Bahraini female college students. It had an interval consistency of 0.72 and a validity of 0.89. A split half technique was used to test the reliability of each item too. (Table IV).

Statistical analysis

A "t" test was used to determine if there is a significant difference between the pre-post mean scores of the subjects on any of the dependent variables. An alpha level of 0.05 was used for all significance tests.

RESULTS

Comparison of personal data of the subjects are presented in Table I. The means, standard deviations, standard error of the means, pre-post mean

difference, and t value are presented in Tables I, II, III, IV, V, VI, VII. The results of the study indicated that:

1. There were significant changes in the health-related fitness status for female college students. (Table II)
2. There was a significant change in attitude toward exercise and physical activity for female college students as a result of the programme. (Table III)
3. There were no significant changes in body weight. (Table I)
4. There was a significant decrease in resting heart rate for the subjects. (Table V)
5. There was no significant change for the maximum heart rate of the subjects. (Table VI)
6. No significant changes were found in the systolic and diastolic blood pressure of the subjects. (Table VII)

TABLE V
Means, Standard Deviations, and t Value for Group 1
and Group 2 for Resting Heart Rate (beats/min.)

		Pre	Post	mean diff	t value
Group 1 (n=34)	\bar{X}	89	78.147		
	S.D.	12.348	6.994	10.853	7.253*
	SE	2.128	1.205		
	\bar{X}				
Group 2 (n=34)	\bar{X}	91.294	79.235		
	S.D.	8.809	5.805	12.059	8.379*
	SE	1.518	1		
	\bar{X}				

* significant at $\alpha = 0.05$, $t = 2.042$, $df = 33$

TABLE VI
Means, Standard Deviations, Mean Differences and t Value for
Group 1 and Group 2 for Maximum Heart Rate (beats/min.)

Variables		Pre	Post	mean diff	t value
Group 1 (n=34)	\bar{X}	182.32	187.670	-5.35	1.047
	S.D.	29.405	14.7		
	SE	5.07	2.53		
	\bar{X}				
Group 2 (n=34)	\bar{X}	189.147	189.647	-0.5	1.054
	S.D.	2.642	1.203		
	SE	0.455	0.207		
	\bar{X}				

* significant at $\alpha = 0.05$, $t = 2.042$, $df = 33$

TABLE VII
Means, Standard Deviations, Mean Differences,
and *t* Value for Group 1 and Group 2 for Blood Pressure

Variables		Pre	Post	mean diff	<i>t</i> value
Syst	\bar{X}	109.147	109.941	-0.794	0.482
	S.D.	10.157	9.99		
	SE	1.75	1.722		
	\bar{X}				
Group 1					
Dyst	\bar{X}	70.824	69.765	1.059	0.560
	S.D.	8.314	7.812		
	SE	1.43	1.346		
	\bar{X}				
Syst	\bar{X}	109.941	109.147	-0.794	0.483
	S.D.	9.99	10.156		
	SE	1.722	1.751		
	\bar{X}				
Group 2					
Dyst	\bar{X}	70.382	70.235	-0.147	0.147
	S.D.	8.209	9.048		
	SE	1.415	1.56		
	\bar{X}				

* significant at $\alpha = 0.05$, $t = 2.042$, $df = 33$

DISCUSSION

The health-fitness programme employed in the present study was designed and created by the researcher. Intensity, duration, and the health-related fitness components were similar to those studies done by other researchers^{8,9}.

The increase in the muscular strength, muscular endurance, and flexibility indicated the effectiveness of the programme. The decrease in resting heart rate indicated that cardiovascular endurance was altered by the aerobic part similar to those reported in other studies on female college students^{6,8,9}.

The significant changes in attitude is in agreement with others that a good health-fitness programme could change the individual attitude towards exercise¹⁰.

Based on the analysis of the data obtained from the present study the following recommendations were drawn:

1. Health promotion fitness programmes should concentrate on the following:
 - a. health-fitness screening appraisals
 - b. nutrition, weight loss, and gaining weight activities
 - c. health-fitness awareness programmes for women to promote their attitude toward exercise, fitness and health
 - d. stress management activities
 - e. recreation and leisure time activities
 - f. public relationships
2. Developing and offering health-fitness courses for higher education institutes, as a required course to promote the youth health in the State of Bahrain.

3. Replicate the present study on a large number of male and female students to compare the results.
4. Replicate the present study on adults, administrators, academic staff, and others to assess and promote the public mental, emotional and psychological fitness.

CONCLUSION

The non-significant changes in body weight for the subjects in this finding is in agreement with other studies using American and Egyptian college young women in which aerobic programmes did not have any significant decrease in body weight unless the subjects followed a well constructed diet with the programme¹¹.

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