

THE EFFECTS OF AN INSTRUCTOR'S  
CERTIFICATION ON FEMALE  
PARTICIPANT'S KNOWLEDGE  
OF FITNESS PRINCIPLES  
IN AN AEROBIC DANCE  
PROGRAM

By

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## CHAPTER I

### INTRODUCTION

Aerobic dance (a popular aerobic activity) was begun by Jackie Sorenson in 1969 when she began conducting exercise classes at a naval base in Puerto Rico where her husband was stationed (Schuster, 1979). Although Sorenson had no experience with the traditional methods of exercise, she did have many years of dancing experience. The idea to combine dance and exercise was inspired when Sorenson took Kenneth Cooper's 12-minute run test and scored in the "excellent" category (Cooper, 1968). Attributing her level of fitness to her many years of dancing, she choreographed dance routines which incorporated Cooper's suggestions for aerobic training.

After two years Sorenson's husband was transferred to South Orange, New Jersey, where she began teaching aerobic dance as an organized class at the YMCA. In 1972, the Aerobic Dance Corporation was formed which was comprised of a group of five instructors. Classes grew in number and Sorenson continues to teach aerobic dance classes today. Approximately 180,000 students and 4,000 instructors are involved in aerobic dance nationwide (Sorenson, 1983).

The term "aerobics" became popular in 1968 when Dr. Kenneth Cooper published a book on physical fitness entitled Aerobics. Literally, aerobics is defined as "with oxygen." According to Astrand and Rodahl (1970), two major factors of physical fitness include the oxygen transport capacity and maximum oxygen consumption. It has been determined that specific physical activities are capable of increasing oxygen consumption and therefore, are termed "aerobic" activities. Cooper designed programs using physical activities which would enhance aerobic conditioning, such as swimming, running, and cycling (Blythe and Goslin, 1985).

Aerobic dance is a combination of continuous, rhythmic, and moderately strenuous routines comprised of a variety of dance forms: folk, modern, jazz, ballet, disco, and the Charleston. Body movements and calisthenics which include hopping, skipping, walking, jumping, sit-ups, toe-touches, and stretches are used to promote flexibility, toning, and cardiovascular fitness (Russell, 1983). According to Chiles and Moore (1981)

aerobic dance exercise programs are designed to improve cardiovascular fitness, and may provide the same psychological benefits as jogging, while offering a challenging workout in a social atmosphere (p. 52).

Jackie Sorenson (1979, p. 5) described her program as "a complete physical fitness program which whispers exercise, and shouts fun." Participants are given the opportunity to dance freely at their own level while their bodies undergo a carefully tested, well-monitored fitness

workout which can strengthen the heart and lungs, tones muscles, improves circulation, and leaves one feeling exhilarated (Russell, 1983). Sorenson continually tests the effectiveness of her dances by using oxygen consumption equipment to measure caloric consumption and training capacity. The routines have been tested on a large group of men and women to determine their popularity and to ascertain whether muscle toning and endurance training have occurred (Sorenson, 1974).

Traditional aerobic dance classes last from 45-60 minutes, and consist of a warm-up, an aerobic intensity session, and a cool-down. Participants find this type of training appealing because once they are shown the basic steps, they are free to improvise and control the degree of the exercise intensity. The primary way in which intensity is determined is through self-monitoring of the heart rate (Rockefeller and Burke, 1979). The most commonly used method by aerobic dance programs for determining heart rate is for the participant to subtract her age from 220 and multiply the result by the percentage of maximum heart rate of which she desires to exercise.

Aerobic dance classes are taught privately as well as through health clubs, colleges and universities, and community recreation and wellness programs. The teachers are varied in their skill and knowledge level. This diversity of qualification among instructors, lack of or incorrect dispersion of knowledge related to fitness and



nutrition, and the increasing number of injuries among instructors and students have generated a recent cause for concern (Russell, 1983).

Dr. Edward Smith, a medical officer at the Dounreay nuclear power plant with an interest in physical exercise, is a strong promoter of physical fitness. In an issue of Current Practice (1982, p. 12), a British newspaper for doctors, he stated that aerobic exercise can reduce stress, promote weight loss, and lower the chances for developing cardiovascular disease (CVD). However, he stated that after the age of 30 "muscles, tendons, ligaments, and bones, made rusty after years of neglect, don't take kindly to being suddenly jerked into action." Painful aches and strains occur occasionally because programs are begun too quickly, too intensely, and do not follow a sequential progression.

Mrs. Victoria Sishi, of the Society of Chartered Physiotherapists, stressed that the heart is a muscle and can also be overstrained. Sishi also stated that the most common faults of aerobic dance classes have been that students are not given enough time to warm-up properly, the peak of the session is too intense, and the cool-down does not occur slowly enough (Wood, 1983). The warm-up should consist of at least five minutes of slow stretching to prepare the body for more strenuous activity. The peak of the session should be reached gradually and should be determined by the fitness level of each individual. The cool-down should consist of at least five minutes of

gradual stretching and light exercise to allow the heart rate to decelerate (Nash, 1985).

There has been no research reported in the literature indicating that certification of instructors will increase or decrease the number of injuries to instructors and students. Questions have arisen as to whether or not knowledge gained by instructors through certification programs is adequate and disseminated to the students during aerobic dance sessions. Or, is the knowledge obtained through certification programs used only to improve one's aerobic dance teaching techniques, such as knowing the correct and safest methods of stretching?

It could prove advantageous for women participating in aerobic dance programs to increase their knowledge about fitness and training principles, such as procedures for conditioning, injury prevention, anatomy and physiology, and nutrition. For example, acquiring basic fitness knowledge could possibly alleviate some injuries resulting from improper exercising techniques. Or, a dance participant might be able to make more intelligent diet choices based upon information obtained from her class. Finally, if for no other reason than to take responsibility for her own health, it would be beneficial for a dance participant to become more knowledgeable about fitness principles.

## Need for Study

Sheryl Marks (1986), International Dance-Exercise Association consultant, has expressed the need for instructor training because the participants could benefit from certification programs; training could enhance injury prevention and illicit better programs. Effective programs are safe and produce physiological effects such as muscle tone, cardiovascular fitness and flexibility.

Richie, Kelso, and Bellucci (1985) researched aerobic dance injuries of instructors and participants and acknowledged the need for instructional techniques to be standardized. They concluded that analysis of instructional techniques would decrease the chance of injury, and recommended training and certification of instructors for the purpose of reducing the risk of injury to both instructors and students.

A study by Vetter, Helfet, Spear, and Matthews (1985) examined aerobic dance injuries and found few significant problems. They concluded that aerobic dance was a safe method of achieving aerobic fitness, providing there is some control over risky training errors, such as the use of exercises which may cause injuries.

Francis, Francis, and Smith (1985) administered a survey to determine the significance of injuries to instructors and students. Among their recommendations was a need for subsequent research to provide information that

could lead to safer programs. They summarized that many instructors had very limited qualifications to teach aerobic dance, and the only qualification many instructors had was having been aerobic dance students.

The certification programs which were represented in this study include the International Dance-Exercise Association (IDEA) and the American College of Sports Medicine (ACSM). The ACSM fitness instructor certification was established in 1982. Four days of lectures were developed on the following topics:

- Physiology of aging
- Epidemiology of coronary artery disease
- Exercise prescription
- Emergency procedures
- Injury prevention
- Fitness assessment
- Methods of determining heart rate and blood pressure
- Metabolic calculations
- Practicums on body composition
- Leadership

According to statistics, 400 people (67%) have been certified as fitness instructors (Nash, 1985).

The Exercise Leader/Aerobics certification was initiated in 1987 by the ACSM. Its purpose was to provide recognition to aerobic dance instructors who have demonstrated practical and theoretical knowledge necessary for effective and safe programs. The requirements for an instructor to be eligible to participate in the Exercise Leader/Aerobics certification program include the following:

1a. Previous certification by a generally recognized aerobic dance group which is neither mail order nor correspondence; or,

1b. Documentation of a minimum of 250 hours of teaching experience in the Exercise Leader/Aerobic field within a two-year period.

2. A demonstrated knowledge and competence in proper leadership of safe, effective aerobic exercise programs.

3. A knowledge of basic exercise science including exercise physiology, kinesiology, functional anatomy, nutrition, health-appraisal techniques and injury prevention.

4. Current certification of cardiopulmonary resuscitation.

5. Two letters of recommendation from individuals capable of assessing the candidates ability (ACSM Brochure, 1987.)

The candidate for the Exercise Leader/Aerobics certification program must pass both a written and practical examination. The written examination is divided into two parts; the first section tests core knowledge related to fitness and exercise, while the second section tests the candidates knowledge pertaining specifically to aerobic dance exercise.

The candidate is tested for her/his practical knowledge on a one-to-one basis with four instructors. Each

instructor is at a different station where the candidate must exhibit knowledge; the stations include the following:

1. Case study health assessment and measurement of blood pressure. At this station the candidate must review a case study and recommend appropriate exercises as well as describe exercise risk factors. The candidate must also demonstrate an ability to measure resting blood pressure.

2. Leadership and Teaching Skills. The candidate must demonstrate a 10-12 minute simulated aerobic dance class.

3. Exercise specificity. At this station the candidate must demonstrate exercises for the development of specific muscle groups.

4. Video Examination. The candidate must identify instructor and/or participant errors while viewing a filmed aerobic dance class.

A three-day workshop, which is not a prerequisite for certification, is offered for review of the following areas: anatomy and kinesiology, exercise physiology, nutrition, prevention of injury, health assessment techniques, and information pertaining specifically to aerobic dance. The cost for attending the workshop is \$275 and the certification fee is \$150 for an ACSM member and \$175 for a non-member (ACSM Brochure, 1987).

The International Dance-Exercise Association (IDEA) was initiated by Kathie and Peter Davis to provide communication among instructors, businessmen, and health professionals.

IDEA provides low-cost liability insurance, consultations, and referrals to its members. IDEA also provides a bi-monthly newsletter with information for all types of aerobic dance instructors (Nash, 1985).

IDEA, a non-profit organization established to set guidelines for aerobic dance programs, is based in San Diego and has 8000 instructors. In 1984 a committee of 52 professionals began a two-year study with the IDEA Foundation to formulate guidelines for the training of aerobic dance instructors. Included on this committee were instructors, university and private health and fitness experts, and health industry leaders. The guidelines created by these representatives are a set of standards intended for the entire dance industry to use to improve itself (Gillette, 1985).

The IDEA certification examination tests the instructor's knowledge in the following areas:

- Exercise physiology
- Basic anatomy and kinesiology
- Emergency training
- Legal issues
- Injury prevention
- Exercise programming skills
- Health screening
- Nutrition and weight control

(IDEA Brochure, 1986)

Unlike many other certification programs, the IDEA Foundation does not train instructors, it only tests and certifies the instructors. The expertise of the Educational Testing Service was used to help develop and administer the test, which adds to the validity of the process.

The IDEA committee decided against a mandatory practical test for the following four reasons: (1) many written questions covered the practical information; (2) it was impractical to have several types of practicals and the use of a standard practical would be unfair to the other segments of dance exercise, such as slimnastics or aquaexercise; (3) the cost would be expensive and the scoring would be highly subjective; and (4) a voluntary practical exam could provide a learning experience for the instructor.

Instructors who have received certification from the IDEA Foundation have the option of submitting a videotape of a routine to be rated by a panel of experts consisting of IDEA instructors. Based upon their performance they will receive a rating sticker to be placed upon their certificate and a report on their strengths and weaknesses from the examiners.

An instructor who has received IDEA certification must complete 16 units of continuing education credit (CEC) every two years, so that she may keep abreast of new developments in the field. Instructors may attend workshops, take approved college courses or take an advanced certification course offered by ACSM to earn their CECs. The continuing education requirement is not intended to be a burden to instructors, but an opportunity to grow professionally (Marks, 1986).



There is a need for more research in the area of aerobic dance certification programs to determine if the dance participants actually do cognitively benefit from more qualified instructors. The authors of many aerobic dance studies agreed there is a need for safe and effective programs which could be accomplished through certified instructors. This study viewed one aspect of a certification program which was to determine the effect of an instructor's certification on the knowledge of fitness principles in an aerobic dance program.

#### Statement of the Problem

The purpose of this study was to determine the effect of an instructor's certification on the female participant's knowledge of fitness principles in an aerobic dance program.

#### Hypotheses

1. There will be no significant differences in knowledge of fitness principles among females participating in IDEA instructor's aerobic dance programs, ACSM instructor's aerobic dance programs, non-certified instructor's aerobic dance programs, and females not participating in an aerobic dance program.

2. There will be no significant difference in knowledge of fitness principles between females participating in certified aerobic dance instructor's

programs (ACSM and IDEA) and a non-certified aerobic dance instructor's program (Skyline Health Club).

#### Limitations

1. No attempt was made to control where the participant's fitness knowledge could be obtained.
2. Taking the fitness knowledge pre-test may have increased the inquisitiveness of subjects for knowledge, which may not have otherwise occurred.
3. Most dance exercise programs have a "drop-in" policy for women which made it extremely difficult to study the same groups for both the pre- and post-tests; therefore, attrition rate was high.

#### Delimitations

1. The subjects used in this study were limited to 42 females participating in aerobic dance programs in Washington, D.C., Northern Virginia, and Tulsa, Oklahoma.
2. The control group was comprised of 31 inactive women from Washington, D.C., Northern Virginia, and Tulsa, Oklahoma.

#### Assumptions

1. It was assumed that there was a wide range of knowledge about fitness-related principles among the subjects.

2. It was assumed that the aerobic dance instructors provided varying levels and amounts of fitness information to the subjects.

3. It was assumed subjects did not guess on answers to questions, due to the option of marking "don't know" on all items.

4. It was assumed that subjects read test items carefully and they answered questions thoughtfully.

#### Definitions

The following are conceptual definitions which will be used in this study:

Aerobic. Literally means "with oxygen."

Aerobic exercise. Work which requires the heart to beat more rapidly, causing more oxygen to travel through the body and which must be accomplished in the presence of oxygen.

Aerobics and Fitness Association of America (AFAA). A major theoretical and practical training and certification program based in Sherman Oaks, California. AFAA was formed in 1983 to establish standards and guidelines for a nationwide certification program.

American College of Sports Medicine (ACSM). A major developer of several fitness and exercise-related certification programs, including a fitness instructor certification program, developed in 1982 and the exercise leader/aerobics specialist, developed in 1987. The ACSM,

based in Indianapolis, Indiana, is a non-profit organization dedicated to providing and generating health and medical sports knowledge.

Cardiovascular exercise. Exercise which improves the functioning of the heart and circulatory system.

Certification. The process by which one's basic knowledge and sometimes, instructional skill of aerobic dance are assessed for the purpose of determining proficiency.

Dysrhythmia. An abnormal rhythm of the heart.

Exercise intensity. The level at which a person trains, usually based upon resting heart rate. It is also used to make recommendations for cardiovascular fitness.

Fitness principles. Basic rules pertaining to components of physical fitness; for example, concepts involving anatomy, nutrition, exercise safety, and physiology.

Inactive women. Women not currently participating in an exercise program designed to improve the cardiovascular system.

International Dance-Exercise Association (IDEA). A non-profit organization based in San Diego, California, which is one of the major foundations established to set guidelines for aerobic dance programs. IDEA was established in 1984 and the certification program was begun in 1986.

Maximum oxygen consumption (Max VO<sub>2</sub>). The maximum amount of oxygen a person is able to use while participating in maximal or exhaustive exercise.

METS. A measure of the amount of work intensity based upon oxygen consumption.

Physical fitness. "The ability to perform daily tasks vigorously and alertly, with energy left over for enjoying leisure-time activities and meeting emergency demands" (President's Council on Physical Fitness and Sports, 1984).

## CHAPTER II

### REVIEW OF LITERATURE

#### Introduction

The review of literature will concentrate on five components of aerobic dance programs: (1) the fundamentals of aerobic dance programs, (2) benefits of aerobic dance, (3) potential injuries related to aerobic dance, (4) certification programs, and (5) low-impact aerobics.

#### Fundamentals of Aerobic Dance Programs

In addition to the concern of many individuals for strength and muscles, there appears to be a great interest in having a healthy heart and lungs. "Aerobic" exercise increases the heart rate which results in more oxygen traveling through the body. When a heart becomes trained by aerobic exercise, which includes activities such as swimming, running, and bicycling, it beats more efficiently, i.e., it pumps the same amount of blood but with fewer beats. The resting heart rate for a sedentary person is approximately 60-80 beats per minute; however, for an aerobically trained individual, it may beat as few as 40-50 times per minute (Lehrman, 1985).

Aerobic dance was developed from the Air Force Aerobics Program which was designed by Dr. Kenneth Cooper. It is "an exercise form that promotes the supply and use of oxygen while the exerciser is engaging in vigorous, continuous, rhythmic activity over a sustained period of time" (Murray, 1984, p. 25). Cooper (1968) recommended the activity be of a vigorous and continuous nature and engaged in three to four days per week.

According to the American College of Sports Medicine, aerobic exercise involves continuous, rhythmical activities which use large muscle groups. For the programs to be effective they must include at least three sessions per week for 15-60 minutes, and the intensity of the activity should be 60-90% of the individual's heart rate.

Dr. D. K. Lamb (1978) also suggested that programs should be individualized and progress should be based upon the response to exercise. A second suggestion he has made was that the exercise chosen should place demands upon the cardiovascular system. Finally, Lamb said the exercise program should become progressively difficult. All instructors should be aware of these basic principles and should also see that their students are knowledgeable.

Jackie Sorenson invented aerobic dance when she used disco, jazz, ballet, and folk dance steps with popular music. Richard Simmon's television shows and Jane Fonda's workouts helped popularize the aerobic dance industry. Soon, women were tossing aside their gym shorts and t-shirts

for leotards, leg warmers, and specially designed aerobic shoes. Aerobic dance has promoted aerobic training and provided a non-competitive social activity for men and women (Lehrman, 1985).

Aerobic dance is moderately strenuous and continuous, which is necessary for training to take place. Dances are choreographed according to the mood of the music and although instructors teach the steps, participants are able to move in their own way. Depending upon the participant's fitness level, the intensity of the dances can be individualized (Rockefeller, 1980).

Effective aerobic dance routines usually include three components: (1) the warm-up prepares the body for more strenuous activity by using slow stretching exercises; (2) the workout period, should progress gradually so the heart will work a minimum of 60% of its work function; and (3) another gradual transition to the cool-down, where stretching takes place and the heart rate decelerates.

The pulse rate, ideally, should be measured six times during a session:

1. Before warmup-for a base comparison.
2. After warmup-to indicate effectiveness of warmup.
3. Five minutes into workout-to indicate work intensity (for adjustment).
4. Five minutes before workout ends-for reassessing work output.
5. After cool-down-effects of cool-down.



6. During recovery-return to almost normal which is indicative of a healthy cardiovascular system (Nash, 1985, p. 148).

Heart rate monitoring also helps the instructor. If the majority of the participants have a heart rate below 60% of their work capacity, the exercise intensity is too low. On the other hand, if their heart rate is above 85-90% of their work capacity, the exercise intensity is too high (Frank, 1982).

In a 1982 Physician and Sportsmedicine Journal article by Legwold, Paul Ward, PED, Director of Education Research and Development for Health and Tennis Corporation of America, was quoted as saying it was not necessary for a person entering a dance exercise program to have a physician's approval. He claimed that because physicians have not had exercise physiology in their professional preparation, it would be like "the blind leading the blind." In 1982 there were relatively few injuries and/or cardiac problems in aerobic dance.

According to Frank (1985), participants should be medically screened before taking part in an aerobic dance program. He also felt a medical release should be required of persons who are obese, hypertensive, over 35, heavy smokers, or have coronary heart disease.

Shinsplints, tendinitis, stress fractures, and muscle strains affect less than one percent of the aerobic dance participants per year, according to John Boyer, M.D.,

medical consultant for Aerobic Dancing, Inc. and member of the Physician and Sportsmedicine Editorial Board. Boyer felt it would be ideal for a dance participant to have a physician's approval before starting a program, but that it was impractical (Boyer, 1982).

According to Kathie Davis the co-founder of the International Dance-Exercise Association, the person shopping for an aerobic dance program should consider the following:

1. Is the room large enough to prevent overcrowding?
2. Is the temperature of the room moderate and does it have good air circulation?
3. Does the facility offer different levels of classes to accommodate students of different fitness levels?
4. Does the floor surface provide both shock absorption and stability?
5. Does the instructor encourage a non-competitive atmosphere in which participants can comfortably work at their own levels?
6. Has the instructor had training in anatomy, physiology, physiology of exercise, kinesiology, care and prevention of injuries, and the teaching of dance exercise, and is the instructor certified to perform CPR and First Aid?
7. Does the instructor offer explanations about the benefits of the exercises and how to do them correctly and in a controlled manner?

8. Does the instructor walk around the room periodically to correct students' movements?

9. Does the instructor have students check pulse rates periodically and explain the importance of monitoring heart rate?

10. Does the instructor change the routine about once a month to prevent boredom?

(Lehrman, 1985, p. 33)

#### Benefits of Aerobic Dance

The primary benefit of aerobic dance is improvement in cardiovascular fitness (Sorenson, 1974). However, participants also develop better muscle tone, flexibility, rhythm, and coordination. The training value of aerobic dance has been substantiated through many scientific studies. One of the first studies involved 150 women from Immaculata College in Pennsylvania. Using Cooper's 12-minute running test and fitness categories (1968) as a basis for evaluation, the following results were obtained after seven weeks:

	Experimental Group	
	Pre-test	Post-test
Very poor and poor	61%	27%
Good	5%	25%
Excellent	0	3%

There was very little change in the control group; eight percent were in the good category after the pre-test and 10% were in that category after the post-test.

In a study done by Carl Foster (1975), he found physiological results similar to those found by Weber in 1973. Exercise intensity was determined to be 70%-80% maximum oxygen consumption (max  $VO_2$ ) in the four subjects who were studied. Foster concluded that aerobic dance would elicit a training effect providing the exercise met the intensity and duration minimums.

Vaccaro and Clinton (1981) performed a study to determine the effects of aerobic dance on maximal oxygen uptake and body composition of college women. It was determined that after a ten-week training period of three days per week, 45 minute sessions, the women significantly increased their maximum oxygen, but did not significantly decrease their percent body fat. One explanation for the failure of the aerobic dance program to produce changes in body fat was that the program was too short to produce visible effects.

A study completed at Duke University Medical Center demonstrated the effectiveness of aerobic dance for improving cardiovascular fitness. Subjects consisted of 29 volunteers who were not currently participating in an aerobic exercise program. Sixteen subjects participated in an aerobic dance program three times/week for six weeks and 13 control subjects continued not participating in a program. All members of the dance group lowered their resting heart rates and improved their performance on

Cooper's 12-minute test, which indicated improved cardiovascular fitness (Watterson, 1984).

Blyth and Goslin (1985) conducted a study resulting in significant cardiovascular system improvement in 12 aerobic dance participants involved in a 10-week program. The key to the improvement was a program which included sufficient exercise intensity and duration. A previous study by Eickhoff et al. (1983) had found that aerobic dance produced no cardiovascular improvements; however, the study was completed at submaximal exercise loads.

At Washington State University a study was conducted to determine if their aerobic dance programs were beneficial to students. Female graduate assistants taught the classes twice a week for 15 weeks with each instructor responsible for what she taught. The results of the study showed that the 84 females participating in aerobic dance classes at WSU did not significantly improve cardiovascular fitness. Other previously mentioned studies have shown a significant change; therefore, it was concluded that WSU did not comply with the recommended training principles (Russell, 1983).

A study by Milburn and Butts (1983) and a study by Johnson, Berg, and Latin (1984) compared the cardiovascular benefits from jogging with the benefits of aerobic dance. The results showed no significant difference in training effects when both types of exercise were performed with the same intensities, durations, and frequencies.

Dr. Harold Falls (1982) professor in the Department of Physical Education at Southwest Missouri State University, felt that the more fit an individual was, the more benefit he/she would receive from aerobic dance. The less fit, or typical aerobic dance participant, usually danced at an intensity level too low to receive the same benefits as, for example, the instructor.

In a study involving 10 adult females, it was determined that aerobic dance could improve cardiovascular efficiency and prove beneficial in weight control because of the calories expended. The metabolic results of the 30 minute dance sessions are summarized below:

High intensity session	8-9 METS
Medium intensity session	6 METS
Low intensity	3.9 METS

It was also concluded that a high intensity session would be comparable to running at 5.5 mph or 240 kcal (Kerr, 1984).

Morgan (1985) found that several authors of studies reported that aerobic dance programs contribute to weight loss and reduction of body fat. However, these studies did not show evidence to support such statements.

Another conclusion Morgan made after studying existing research was that although the finding suggested aerobic dance did improve cardiovascular efficiency, the energy cost of the most strenuous aerobic dance workout was similar to the energy cost of 9.5 min./mile running pace. This level would be appropriate for producing a training effect in an

untrained person, but probably not strenuous enough to maintain the aerobic capacity of a trained individual.

According to Igbanugo and Gutin (1979, p. 312) there are three intensities of aerobic dance, which are determined by how they are choreographed (low, medium, and high). The intensities are of the following equivalencies:

<u>Intensity</u>	<u>Equivalency</u>	<u>Calories</u>
Low	Walking	3.8 Kcal/min.
Medium	Jogging	6.2 Kcal/min.
High	Running	8.8 Kcal/min.

Because there are varying intensities, aerobic dance could be useful in cardiac rehabilitation. Low intensity aerobic dance could be suitable and beneficial for people previously bedridden or having heart problems which would provide a good starting point for the initiation of a training program (Igbango and Gutin, 1978).

Lenore Zohman (1981) a cardiologist from San Diego has used aerobic dance with his patients. One of the largest advantages seen was the ability to have a full class of patients dancing at three different intensity levels. One person may have been barely moving, while another was exercising vigorously to the same music. Aerobic dance allowed for individual variations in both style and intensity.

According to Dr. Bill Zuti and Dr. Lawrence Golding (1976) weight reduction is one goal of many women enrolled in aerobic dance programs. Aerobic dance not only provides women the opportunity to lose weight but also, to lose

weight in such a manner as to lose body fat and retain and improve muscle tissue. In a study conducted by Zuti and Golding (1976) weight loss between women who only reduced their caloric intake was compared with weight loss in women resulting from their reduction in caloric intake and increased physical activity. With the caloric expenditures being held constant, comparable amounts of weight were lost; however, the non-exercising group lost both fat and muscle tissue, while the group that did exercise lost only fat tissue.

Dr. Herbert Weber (1974) conducted a study to calculate the number of calories used per hour of aerobic dancing, based upon the intensity of the workout. The results, which are seen below, were determined by having women who ranged in skill level from novice to advanced, wear a portable respirometer on their backs to measure the number of calories burned.

<u>Calories Used Per Hour of Aerobic Dancing</u> Intensity of Workout	<u>Body Weight in Pounds</u>						
	100	120	140	150	160	180	200
Low	215	230	245	260	275	290	305
Moderate	350	375	395	420	445	470	490
High	515	530	585	620	655	690	725

Weber concluded from his research that aerobic dance could improve cardiovascular and metabolic efficiency. In his study, heart rates of 10 aerobic dance instructors measured immediately after high intensity dancing ranged from 160-220 beats per minute. He also measured the dancers' oxygen



consumption mean values for low, medium, and high intensity routines to be 13.8 milliliters per kilogram per minute (ml/kg/min), 21.1 ml/kg/min., and 28.32 ml/kg/min., respectively.

Rockefeller and Burke (1979) completed a study which showed that subjects who participated in aerobic dance programs three times per week for ten weeks, improved their cardiovascular fitness. Aerobic dance also proved helpful in weight loss; approximately 300 calories were used in a 45-minute session. Also, more lean body mass occurred as fat tissue is lost.

Dowdy, Cureton, DuVal, and Ouzto (1985) conducted a study to determine the effects of aerobic dance upon physical work capacity, cardiovascular function, and body composition of young women. Previous research in this area was limited to college-age women (Milburn and Butts, 1983; Rockefeller and Burke, 1979; Vaccaro and Clinton, 1981), and the authors felt the effects of aerobic dance on older women might not be the same as for younger women. In addition, only the study by Vaccaro and Clinton (1981) measured body composition changes, while the other researchers measured only changes in total body weight. However, the study by Vaccaro and Clinton was limited because a control group was not used.

The results of the Dowdy, Cureton, DuVal and Ouzto study (1985) found that changes in heart rate at rest and during submaximal exercise were similar to other methods of

endurance training. They also found there were no significant changes in body composition without dietary control.

Most studies on aerobic dance have been concerned with physiological benefits; a study by Eickhoff, Thorland, and Ansorge (1983) studied psychological benefits in addition to the physiological benefits of 39 women volunteers. The Tennessee Self Concept Scale was used to measure general self concept and physical self concept in pre- and post-tests. No significant difference was seen between the pre- and post-psychological tests. These non-significant results were attributed to the already desirable psychological scores displayed on the pre-test.

In an article regarding the current status of required vs. non-required physical education courses at the college-level, James LaPoint (1982, p. 49) felt aerobic dance was an "innovative fitness course." It provided a source of aerobic training for those who were not particularly motivated by the traditional aerobic exercises, such as swimming and running. Even the United States Military Academy offered aerobic dance, jazzercise, and slimnastics in their physical education curriculum.

In a recent study, Dr. James Garrick (1986) studied dancers who use the wrist or hand-held weights. He found that no significant difference occurred between the exertion levels of women when exercising with and without weights.

When using weights, the women tended to slow down their leg movement to off-set any change in exercise intensity.

Aerobic dance can improve body tone and posture. Posture can be enhanced by aerobic dance because the body learns how to move properly and smoothly, which will result in less fatigue and fewer back problems (Kuntzleman, 1979).

The improvement and slowing of varicose veins is another probable benefit of aerobic dance. Varicose veins result from restricted blood flow to the veins in the legs, caused from excessive abdominal weight. Consequently, the blood tends to pool in the legs and in turn, pushes the veins toward the skin surface. Aerobic dance programs can strengthen abdominal muscles, thus alleviating the pressure on the veins of the legs. Also, through aerobic dancing the veins in the legs will become more elastic and more likely to remain in their proper place (Kuntzleman, 1979).

Several studies have been conducted to determine if aerobic exercise lowers the incidence of heart disease. Dr. Kenneth Cooper (1968) conducted a study in which results indicated that a person's risk of obtaining heart disease decreases as his/her level of fitness increases.

Dr. Samuel Fox and Dr. William Haskell (1967) summarized the studies linking exercise with decreased incidence of heart disease by saying:

There is not enough evidence to prove that exercise prevents heart disease, but it certainly is considered by many to be a promising field of investigation and a prudent practice for most people to follow (p. 806).

William Zuti, PhD, the YMCA's associate director of program development, said dance exercise participants were a low-risk population in regard to heart disease. One reason, he explained, was the non-competitive aspect of aerobic dance, as compared to jogging. Zuti said, "aerobic dance has been around long enough that if it were dangerous, we would know" (Legwold, 1982, p. 149).

Aerobic exercise has also been found effective in combating stress and increasing energy. The late Dr. Paul Dudley White (1970, p. 214), dean of American cardiologists, once said,

Vigorous leg exercise is the best antidote for nervous and emotional stress that we possess, far better than tranquilizers or sedatives to which, unhappily, so many are addicted today.

Dr. Herbert deVries (1972) completed a study which demonstrated that a 15-minute walk reduced neuromuscular tension more effectively than tranquilizers.

With the advent of mainstreaming came the understanding that the mentally retarded have the same needs as other persons, and physical fitness programs provide opportunities for the mentally retarded to meet those needs with success. The mentally retarded's motor abilities are lower than the abilities of intellectually normal persons; however, they are able to improve their fitness levels when the exercises are progressive and systematic in nature. A study was done by Bonnie Barton (1972) to determine if aerobic dance could increase fitness levels and improve self-concepts among the

mentally retarded. The results of the study were positive, in that the mentally retarded did increase their fitness levels and developed a more positive self concept.

#### Potential Injuries Related to Aerobic Dance

In a study by Richie, et al. (1985), it was established that the number of students being injured in aerobic dance classes was as high as 45% and as high as 75% among instructors. Because of the high incidence of injury among students and instructors, consumers are becoming more aware of the occurrence of unqualified personnel teaching aerobic dance classes.

Despite the recent warning that aerobic dance can cause injuries, Dr. James Garrick (Garrick, Gillian, Whiteside, 1986), an orthopedic surgeon and the Director of St. Francis Memorial Hospital's Center for Sports Medicine in San Francisco, has conducted two studies which have shown aerobic dance injuries to be less common than injuries sustained from running or tennis. He cited that the reason being the close supervision of the students by the instructors. Garrick found that an average aerobic dancer would attend class for 1.5 years before incurring an injury, and only one out of seven of those injuries would require medical attention.

One example of a less than desirable program taught by an unqualified instructor occurred in a suburban Chicago neighborhood. A woman entered the Tighten-Up Health Club and filled out a form to take a free trial class. The form asked her age, name, and address. The woman's leg and arm circumferences and her blood pressure were recorded and she was told her progress would be carefully monitored. In essence, "monitored carefully" meant she would be measured again in six months. The woman then joined the exercise group, but about half-way through the workout she felt dizzy and had to stop. The instructor had her sit down and place her head between her legs and eat a pretzel. The woman did not sign up for the class and the Tighten-Up Health Club had vanished within a week (Nash, 1985).

The question has arisen as to whether the gains of aerobic dance outweigh the potential injuries of the program. Participants can decrease their weight, improve their cardiovascular condition, and can generally feel better about themselves. However, those same participants may have to deal with shin splints, tendinitis, or stress fractures in the process of achieving their fitness goals. These injuries have been shown to occur in women who only increase their exercise intensity, frequency, and duration by a small amount. Either the possibility of such injury or the actual occurrence of an injury has caused many participants to withdraw from aerobic dance programs (Koszuta, 1986).

Some possible injuries and physical problems that may result from dance exercise include: achilles tendinitis, shin splints, muscle soreness or cramps, strains, and sprains. Achilles tendinitis is an inflammation of the tendon connecting the heel and the foot to the back of the calf muscle. In aerobic dance, it is most often caused by excessive stretching upon performing a dance movement. Proper warm-up and cool-down can help alleviate achilles tendinitis (Kuntzelman, 1979).

Chance of contracting shin splints, which are pain in the shins and usually upon movement, can be decreased by dancing on a soft surface. Also, a good pair of shoes with an adequate amount of cushioning can be helpful. Muscle soreness, cramps, and strains are to some degree also a part of many exercise programs. The extent to which they occur can be reduced by beginning a program slowly and having adequate warm-up and cool-down periods (Kuntzelman, 1979).

Sprains are more serious types of injuries which result from a stretching or tearing of ligaments. Ankle and knee sprains are the most common types seen as a result of participating in aerobic dance programs. Prevention of sprains entails recognizing fatigue, because many injuries occur when a participant continues to exercise at a high intensity after experiencing tiredness (Kuntzelman, 1979).

In a study done from 1981-1982 in the Sports Medicine Center of Union Memorial Hospital in Baltimore, 24 aerobic dance instructors and 37 participants were evaluated for

injuries. Eighty-two percent of the injuries involved the lower extremities: the problems included stress-fractures, shinsplints, bursitis, and knee pain. The problems were diagnosed as over-use injuries, of which there are two types: (1) tendon and bursa pain caused by repetitive motion and (2) tissue failure, such as stress fractures, resulting from the previously mentioned problem not being given enough time to heal. Over half of the patients had made an error in training, either beginning a program too vigorously or an instructor had added an additional class to her schedule.

The purpose of a study by Richie, et al. (1985) was to explore the sites and frequencies of injuries in aerobic dance. In this particular study of 1,233 students and 58 instructors, 75.9% of the instructors and 43.3% of the students had been injured as a result of aerobic dance. The most common location of injury in both instructors and students was found to be the shin, while the second most common site was the foot. It was concluded by the authors, however, that the results could have been skewed, because the 50% respondent rate to the survey on injuries was probably comprised mostly of participants who had been injured.

In Richie's, et al. (1985, p. 139) study, an injury was defined as "any condition causing significant pain and/or limiting participation." This broad definition was used so



as not to miss problems that would not require a physician, such as shinsplints.

Richie's, et al. (1985) study also examined factors that affected the injury rate, including physical characteristics, shoe type, and frequency and length of participation. There was no correlation found between a participant's physical characteristics and the risk of injury. However, there was a significant relationship between injured participants who danced more times per week than non-injured participants.

The floor surface type found to be most often associated with injuries was a hard surface, such as concrete or linoleum; padded and wood-suspension floors caused fewer injuries. Results of shoe types related to injury rates were not considered accurate because the varying shoe types were not represented equally (Richie, et al., 1985).

In another survey of instructors (Francis, Francis, and Smith, 1985) regarding aerobic dance injuries, not only were injury trends revealed but also information on the characteristics of instructors. The survey was given to approximately 135 instructors who attended a free workshop co-sponsored by San Diego State University and the National Injury Prevention Foundation.

Sixty-five percent of the instructors at the workshop were self-taught, while 58% had been trained on the job. Only 38% of the participants had attended an aerobic dance

workshop and another 27% had taken a training course. Other qualifications of instructors included the following: physical education (22%), dance (14%), recreation (6%), sportsmedicine/athletic training (3%), and physical therapy (.7%). Finally, 44% had no formal training to teach aerobic dance, but did have a background in at least one of the following areas: exercise physiology, kinesiology, biomechanics, anatomy, or dance methods.

The survey also revealed that 103 of the 135 instructors had experienced injury as a result of aerobic dancing. Sixty-four percent of the injuries were new, while 36% were recurrent old injuries. The instructors were also asked to rank the location of injuries to their students, which again resulted in shin problems being the leading injury.

Partially because of the reported high heart rates associated with aerobic dance (Weber, 1973), a study of the ECG effects was done by Metcalf and others (Metcalf, Watson, Matthews and Gwynn, 1981, p. 44). The testing was done on five well-conditioned women and it showed that aerobic dancing met or exceeded the intensity level, or target heart rate. The authors suggested physician approval of aerobic dance because this type exercise may be contraindicated in people with heart problems and could cause dysrhythmias in others due to the intensity. It was also suggested that a participant might not be aware of her/his exercise intensity because of "the ergogenic effect of the music and for the

pressure associated with moving in cadence as part of a group."

### Certification Programs

A proposed Senate Bill Number 14 was recently defeated in California. The bill would have made it mandatory for exercise workers who work for California health studios to be certified. The bill after its defeat, was sent to a committee for further study. According to the Aerobics and Fitness Association of America (AFAA), only 10% of the aerobic dance instructors in the United States have formal training or certification (Nash, 1985).

When aerobic dance was new, all that was required of an individual who wished to become an instructor was that she/he had exercise clothing, a music tape, and enough routines to comprise a 45-60 minute class. After building a clientele, an instructor was usually on her own to learn fitness information, which may or may not have come from reliable sources. Courses concerned with aerobic training, injury prevention, and exercise prescriptions had not yet surfaced. This lack of formal training led to injuries, and in turn, lawsuits. Today, there are many opportunities for training and certification which should enhance the aerobic dance industry. The major training and certification programs are offered by the Aerobics and Fitness Association of America (AFAA), the International Dance and Exercise

Association (IDEA), and the American College of Sports Medicine (ACSM) (Gillette, 1985).

The AFAA, which is based in Sherman Oaks, California, was formed in 1983 to establish standards and guidelines for a nationwide certification program. The AFAA national primary certification for aerobic exercise instructors included a 40-hour course in theoretical and practical training. Training included the following components:

- Basic anatomy and physiology
- Principles of conditioning
- Flexibility
- Nutrition
- Medical and environmental considerations
- Legal aspects of exercise instruction
- Components of physical fitness
- Cardiovascular function
- Correct exercise performance
- Injury, prevention and treatment
- Weight control and behavioral disorders
- Anatomy of a workout

(AFAA Brochure, 1986)

At the completion of the workshop, the participant must pass a written examination which was standardized by the National Fitness Testing Council, and a practical examination in which they demonstrated specific exercises. The total cost of the workshop and testing was \$195. Since 1983 AFAA has certified more than 4,000 instructors (Nash, 1985).

The instructor certification through AFAA is valid for two years. To renew their certification instructors must have current CPR certification and have completed a minimum of 15 hours of continuing education. Among the acceptable continuing education courses are college or university

courses in subjects such as anatomy, sports medicine and nutrition, and ACSM courses.

The AFAA also offers a "Specialty Certification for Low Impact/Low Weight Exercise." This certification, which also costs \$195, includes a 40-hour course in the theory of anatomy, kinesiology, physiology, injury prevention and a practical component to study low-impact aerobics, with and without weights. The prerequisites for the Low Impact/Low Weight Speciality Certification are a current AFAA primary certification and a current CPR certification.

A new certification program introduced in 1987 by AFAA was the "Overweight/Overfat Speciality Certification." This course was designed to provide instructors with information concerning the special needs of the overweight population including dieting, behavior modification, self-esteem, and exercise. The practical component of the program included the testing of psychological, cardiorespiratory, and physiological effects upon the overweight individual. The Overweight/Overfat Speciality Certification is a 40-hour course which costs \$195 and is open to all instructors with a current AFAA and CPR certification (AFAA Brochure, 1986).

The Institute for Aerobics Research (IAR) began certifying instructors in 1980. They offer a two-week workshop with two different courses and different types of certification. The physical fitness specialist course has been taken by police, fire safety officials, and instructors of hospital and wellness programs and health clubs. The 40-

hour course, which concludes with a written and practical examination, costs \$500. The fitness specialist course includes the following material:

- Fitness assessment
- Nutrition
- Feedback methods
- Exercise physiology
- Kinesiology
- Coronary risk
- Exercise prescription
- Motivation techniques
- Safety
- Anatomy
- Stress management

In 1984 the IAR began giving a second course for certification in group exercise leadership. This advanced, 40-hour workshop costs \$500 and includes: group assessment, supervision techniques, leadership/teaching techniques, dance and rhythmic exercises, and proper body alignment. The written and practical exams for certification in this course cover material from both the fitness specialist and exercise leadership course (Nash, 1985).

The YMCA trains and tests its instructors. Only YMCA instructors may take the YMCA physical fitness specialist certification workshop. The course is comprised of 44 hours of training, costs \$225, includes lectures, and a written exam. Approximately 450 people take and pass this test yearly. They teach fitness classes at 2200 YMCA's throughout the United States (Nash, 1985).

Jackie Sorenson's Aerobic Dance Corporation employs approximately 4000 instructors, many of whom are former students. For a woman to qualify as an instructor in 1982,

she had to complete the following: be timed in a 1 1/2 mile run, meet a weight requirement, be trained in CPR, be knowledgeable about Sorenson's heart rate monitoring formula, be a non-smoker, and attend workshops (Legwold, 1982).

The American Aerobics Association (AAA) of Durango, Colorado, will issue certificates for \$75 by mail. The applicants send a videotape of themselves leading a class and certification is based upon review of this tape (Nash, 1985).

Many instructors receive in-house training. Clubs or studios which specialize in aerobic dance, often train their own instructors. Instructors who are trained under these circumstances, usually must adhere to specific styles and methods set forth by the club or studio. Depending upon the competency of the instructor-trainer, this may or may not be safe exercise training (Gillette, 1985).

William Zuti, PhD, YMCA associate director of program development, felt extensive training in in-house programs was sufficient, but that the programs should be developed by individuals who have training in exercise physiology (Legwold, 1982). John Boyer (1982), medical consultant for Aerobic Dancing, Inc., says every decent program should have a medical advisory board.

The dance industry has created employment for thousands of dance and exercise instructors. It is a full-time job for some and a part-time job for others, which averages

about \$10 per hour. Some instructors are opposed to certification because they feel it is just another marketing ploy. Also, a few experienced instructors view certification as threatening to their job security, in other words, "they have nothing to gain and everything to lose if they flunk the test" (Nash, 1985).

On the positive side of certification programs, instructors receive recognition and in turn, a respect for their efforts to improve themselves. The consumers will receive a higher quality of instruction and health club owners will have a better understanding of qualifications when they are hiring instructors. In addition, the more qualified the instructor, the more money she/he will be able to demand from either participants or health club owners (Marks, 1986).

According to Nancy Gillette (1985), an AFAA consultant, students will choose your class not only because you offer a safe and effective workout, but because you motivate them to do well, educate them along the way and help them enjoy and feel good about themselves and their bodies. The students will choose you not just for what you know, but for how you do it (p. 38).

#### Low-Impact Aerobics

Low-impact aerobics was initiated as an alternative to the supposedly high injury rate, high-impact aerobics. It has been called by some instructors a "misery-free" form of aerobic dance. During low-impact aerobics, one foot must remain on the floor at all times. The upper body movements



are increased, while the lower body movements are less ballistic. This type of aerobics is beneficial for people with previous injuries or other biomechanical problems and the overweight and sedentary population (Koszuta, 1986).

However, there are still problems associated with even low-impact aerobics. Dr. Douglas Richie, et al. (1985) felt that because of the exaggeration of low-impact aerobics, much stress is placed upon the ankles, knees, and lower-back. Therefore, people suffering from neck and lower-back problems will still not be able to tolerate this type of exercise.

Dr. James Garrick (1986) a surgeon and director of the center for Sports Medicine at St. Francis Memorial Hospital in San Francisco, also felt that some people may still not be able to tolerate low-impact aerobics. Women with patello-femoral problems may not be able to withstand too much flexion at the knee or all of their weight being placed upon one leg.

Little research has been done regarding the cardiovascular effectiveness of low-impact aerobics. However, one 1986 study by Dr. Robert Otto, director of the Human Performance Laboratory at Adelphi University in Garden City, New York, compared the energy expenditure in high-impact aerobics with that of low-impact aerobics in 25 subjects. He found that there was a 28% increase in energy consumption for high-impact aerobics, compared with only an 8% increase in low-impact aerobics. However, although the

high-impact aerobics produced a more beneficial workout, the low-impact aerobics met the minimum training standards established by the ACSM.

Dr. Peter Francis, associate professor of physical education at San Diego State University, did an unpublished study on data he collected at a regional IDEA convention. He compared the training effects of aerobic dance at two intensity levels: 65% to 70% of maximum heart rate and 80%-90% of maximum heart rate. From preliminary results Francis found that the lower intensity groups could use the same amount of energy as the high intensity group, providing they danced for a long enough period of time (Koszuta, 1986).

Linda Shelton, MS, an exercise physiologist and national training instructor for the Aerobics and Fitness Association of America, also completed an unpublished study, in 1982. She studied the physiological effects of a ten-week low-impact aerobics program on 15 sedentary women. The diet of the women, who were ages 35-64, was not controlled; however, there was an average of 2.5% decrease in body fat. The other benefits of the low-impact aerobics program which were found included decreased blood pressure, decreased resting heart rate, and increased stroke volume.

The results of this study indicated that low-impact aerobics were beneficial to sedentary women, which may be the key. While the intensity level was high enough for untrained participants, it may not be high enough for trained participants to receive any benefits. It was also

suggested that low-impact aerobics may be too strenuous for populations such as pregnant or postpartum women or obese individuals (Koszuta, 1986).

Richie said of low-impact aerobics,

Newcomers to and exercise program find euphoria and excitement in a new activity. If there is a way to minimize aches and pains, to eliminate the problems that might discourage these newcomers from continuing, we should try it (Koszuta, 1986, p. 158).

## CHAPTER III

### METHODS AND PROCEDURES

The purpose of this study was to determine the effect of an instructor's certification on the female participant's knowledge of fitness principles in an aerobic dance program. This chapter discusses the methods and procedures used by the researcher for this study.

#### Instrument Development

The literature did not reveal any suitable, standardized fitness knowledge tests appropriate for this study. Therefore, it was necessary to develop such an instrument, relying upon sample tests given by aerobic dance certification programs and upon the fitness knowledge components from health text test banks.

The first draft of the instrument contained 49 true-false questions, which included the following areas: injury prevention, nutrition and weight control, exercise physiology and lifestyle diseases. To alleviate the problem of guessing, a "don't know" option was included in the answer column.

The content validity of the instrument was determined by a panel of experts which included the following

professionals: Dr. Marcia Burrus, Health, Physical Education, and Recreation Department Head at the University of Tulsa, with a background in aerobic dance; Mr. Vince Brust, exercise safety specialist and the state of Pennsylvania representative for the International Dance Exercise Association; Ms. Patty Turner, member of Rhythmic Aerobics advisory board and teaching staff; Dr. Steve Edwards, Associate Professor in the School of Health, Physical Education and Leisure at Oklahoma State University, with an expertise in the area of research and statistics; and Ms. Gail Doan, program director and aerobic dance instructor at Skyline Health Club in Arlington, Virginia. Members of the panel were each sent a copy of the instrument with a letter asking them to determine if the terminology was acceptable, if the statements were concise, and if the statements were appropriate. Based upon recommendations from the panel, a revised instrument was developed.

#### Pilot Study

A pilot study was conducted to field test the fitness knowledge test. The revised instrument was administered to three aerobic dance classes, one at the Skyline Health Club in Arlington, Virginia, and two classes taught at Trinity College in Washington, D.C., with a total of 100 participants. The results of this application of the examination were used to determine the statistical validity.

The Flannagan Method (1939) of item analysis was used to determine the following three characteristics of each item in the test: (1) the item difficulty, (2) the index of discrimination, and (3) the frequency with which each response was chosen.

Following the item analysis of the instrument, fourteen questions were eliminated either because their difficulty rating was too high or too low or because the index of discrimination rating was unacceptable. Ten revised or new questions were added to the instrument, resulting in a total of 45 items.

An equal number of nine items for each topic were represented in the instrument: nutrition and weight control, exercise physiology, lifestyle diseases, exercise safety, and training principles. Because a pre- and post-test were going to be administered, the items selected for the instrument had a mean rating of greater difficulty than items which would be acceptable for a test given only one time.

A second pilot study to test the second revised instrument of 45 items was administered to a different aerobic dance class from the Skyline Health Club, which was comprised of 45 women. Item analysis was again performed on the completed tests and the reliability of the instrument was also determined from the final pilot study. The Kuder-Richardson formula method was used to determine what Burrow (Burrow and McGee, 1979) considered to be, the "lower limit

of what the real reliability of a test may be." The reliability coefficient which was determined to be .78 was acceptable; therefore, this instrument was determined to be appropriate for use in the study (Appendix A).

### Selection of Subjects

The trend currently in many health clubs is a drop-in policy for aerobic dance classes. Members of the clubs are welcome to attend any class and at any time convenient to them. While this is appealing to the participants, it does not encourage regular attendance, which is necessary for a program to be safe and effective. This also made it difficult to find a group of women who would be available for both the pre- and post-tests.

Dance studios were found to have more regular attendance procedures; however, many instructors working at a dance studio had received only in-house training. Also, many of these studios only offered four-week sessions. Through phone calls, complaint instructors with certification training from IDEA, ACSM, and a non-certified instructor, whose programs lasted a minimum of eight-weeks, agreed to have their classes participate in the study.

A total of 98 women from five intact groups volunteered to participate in this study. Random sampling was not used in order to make it possible for classes of instructors from varying certification programs to be included in the study. Instructors who agreed to have their students participate in

the study were asked to strongly encourage all students in their classes to take the tests.

Two control groups of women not currently participating in an aerobic dance program were selected from the cities of Washington, D.C. and Tulsa, Oklahoma. A group of 18 students enrolled in a sign language course at the University of Tulsa, in Tulsa, Oklahoma, and a group of 17 faculty members at Trinity College in Washington D.C. volunteered to participate as the control group of this study.

An experimental group of women participating in an aerobic dance class taught by an instructor with IDEA certification was selected to participate in the study. This experimental group was actually a combination of three classes of women from the Exercise Studio in Vienna, Virginia. All classes were taught by an IDEA instructor. A total of 26 women from this group participated in the pre-test.

An experimental group of 15 women participating in an aerobic dance class taught by an instructor with ACSM certification was selected to participate in the study. This program was located at the Tulsa Jewish Community Center in Tulsa, Oklahoma.

An experimental group of 22 women participating in an aerobic dance class taught by an instructor with no certification was also selected to participate in the study.



This group of women was participating in an aerobic dance class at the Skyline Health Club in Arlington, Virginia.

#### Testing Procedures

All groups participating in the study were administered a pre-test, and eight weeks later they were administered a post-test. The researcher administered both pre- and post-tests to participants in the Washington, D.C. and Virginia areas. However, it was necessary for the instructor of the ACSM group and a faculty member from the University of Tulsa to administer the tests in Tulsa, Oklahoma. Written instructions were sent with the tests and verbal instructions via telephone were given to assure test administration would be standard.

The participants were not told the exact nature of the study for the purpose of decreasing the possibility of the Hawthorne Effect. Participants were asked to place their initials in the upper right hand corner for the purpose of identifying the same groups taking the pre- and post-tests. Participants were advised of this and assured the results would be anonymous.

At the time of the administration of the post-test, attrition had occurred in all of the groups. The rate was highest in the group with drop-in attendance procedures and the IDEA group, whose participants were offered a flexible attendance policy, meaning they enrolled for a specific number of classes and could attend any of the morning or

evening classes. A total of 74 participants took the post-test; the number of participants in each group taking the post-test were: IDEA (15), ACSM (11), Tulsa University (15), Trinity College (17), and Skyline, non-certified (16).

Participants were sent the results of their pre- and post-tests following the completion of the administration and scoring of the post-tests. Individuals who participated in the pre-test only, were not sent the results of their test.

#### Analysis of Data

The Oklahoma State University computer center was used to analyze the data collected for this study. Means and standard deviations for both the pre- and post-test scores of the three experimental and one combined control group were calculated at the completion of the post-test.

To determine if there were significant differences of fitness principles knowledge among women participating in IDEA instructor's programs, ACSM instructor's programs, non-certified instructor's programs, or in women not participating in aerobic dance programs, the statistical program for One-way Analysis of Variance (ANOVA) was used from the Statistical Package for the Social Sciences (SPSS) (Nie and others, 1975). If significance had occurred the Newman-Keuls multiple range test would have been used to compare means.

To insure equivalency of groups, a One-way ANOVA was used to compare pre-test scores. The scores on the pre-test were equivalent; therefore, a One-way ANOVA was performed on the post-test scores to determine if there were any significant differences among the groups.

The determination of whether a significant difference of fitness knowledge principles occurred between women participating in certified aerobic dance instructor's programs (ACSM and IDEA) and a non-certified aerobic dance instructor's program (Skyline Health Club) was accomplished by t-tests. A t-test was performed on the pre-test scores to determine equivalency of groups. Because the groups were equal, a t-test was performed on the post-test scores to determine if there was any significant difference between the groups.

## CHAPTER IV

### RESULTS AND DISCUSSION

A total of 74 subjects participated in both the pre- and post-tests of a study to determine the effects of an instructor's certification on the female participant's knowledge of fitness principles in an aerobic dance program. A total of four groups, which included one control and three experimental groups, participated in the study. A control group of women not currently participating in aerobic dance programs was comprised of faculty and students from Trinity College in Washington D.C. and the University of Tulsa in Tulsa, Oklahoma, respectively. The experimental groups consisted of women participating in aerobic dance classes with instructor's of IDEA certification, ACSM certification, and no certification.

#### Results

The first hypothesis stated that there would be no significant differences in knowledge of fitness principles among females participating in IDEA instructor's aerobic dance programs, ACSM instructor's aerobic dance programs, non-certified instructor's aerobic dance programs, and females not participating in an aerobic dance program. To

test this hypothesis, the performance of the ACSM, IDEA, non-certified, and control groups on the fitness knowledge test were compared. The means and standard deviations of the comparative groups are shown in Table I.

TABLE I  
MEANS AND STANDARD DEVIATIONS OF GROUP  
PERFORMANCE ON FITNESS  
KNOWLEDGE TEST

Group	Pre-test		Post-test	
IDEA (15) <sup>a</sup>	$\bar{X}$	28.13	$\bar{X}$	30.60
	SD	5.36	SD	5.36
ACSM (11) <sup>a</sup>	$\bar{X}$	27.00	$\bar{X}$	28.64
	SD	4.64	SD	5.78
Non-certified (16) <sup>a</sup>	$\bar{X}$	25.44	$\bar{X}$	27.88
	SD	5.08	SD	5.90
Control (32) <sup>a</sup>	$\bar{X}$	24.88	$\bar{X}$	25.56
	SD	5.84	SD	6.70

<sup>a</sup>Number of subjects in group.

A One-way ANOVA was performed on the pre-test scores to determine the equality of the groups. An  $F(4,69)=1.07$ ,  $p < .05$ , was not significant. Therefore, a One-way ANOVA on the post-test treatment data was utilized. The post-test result, an  $F(4,69)=1.99$ ,  $p < .05$ , was also not significant.

Therefore, the null hypothesis of no significant difference in knowledge of fitness principles among females participating in IDEA instructor's aerobic dance programs, ACSM instructor's aerobic dance programs, non-certified instructor's aerobic dance programs and women not participating in aerobic dance programs, could not be rejected. The results of the pre- and post-test ANOVAs are seen in Table II and III.

TABLE II  
PRE-TEST ANALYSIS OF VARIANCE  
OF PERFORMANCE ON FITNESS  
KNOWLEDGE TEST

	Sum of Squares	Degrees of Freedom	Mean Square	F	Prob. level
Between groups	128.97	4	32.02	1.07	.38
Within groups	2055.87	69	29.80		
Total	2183.94	73			

TABLE III  
 POST-TEST ANALYSIS OF VARIANCE  
 OF PERFORMANCE ON FITNESS  
 KNOWLEDGE TEST

	Sum of Squares	Degrees of Freedom	Mean Square	F	Prob. level
Between groups	303.27	4	75.82	1.99	.10
Within groups	2629.11	69	38.10		
Total	2932.38	73			

To test the hypothesis that there will be no significant difference in knowledge of fitness principles between females participating in certified aerobic dance instructor's programs and a non-certified aerobic dance instructor's program, t-tests were performed on the scores. The pre-test data were subjected to a t-test for the purpose of determining the initial equivalency of groups prior to treatment. The observed pre-test t was 1.38, which was not significant at the .05 level. Therefore, a t-test was performed on the post-test scores. The observed post-test t was 1.03, which was also not significant at the .05 level. The null hypothesis of no significant difference in knowledge of fitness principles between females participating in certified aerobic dance instructor's

programs and a non-certified aerobic dance instructor's program could not be rejected. The means, standard deviations, and t-test results of the pre- and post-tests are shown in Table IV.

TABLE IV  
PRE- AND POST-TEST MEANS, STANDARD DEVIATIONS  
AND T-TEST RESULTS OF CERTIFIED AND  
NON-CERTIFIED GROUP PERFORMANCE  
ON FITNESS KNOWLEDGE TEST

Group	Pre-test		Post-test	
Certified (26) <sup>a</sup>	$\bar{X}$	27.65	$\bar{X}$	29.77
	SD	5.00	SD	5.52
			t=1.38	t=1.03
			df=40	df=40
Non-certified (16) <sup>a</sup>	$\bar{X}$	25.44	$\bar{X}$	27.88
	SD	5.08	SD	5.91

<sup>a</sup>Number of subjects in group.

### Discussion

The One-way ANOVA performed on the pre-test scores for all groups showed that these groups had very comparable scores. As a result of this equality, it was appropriate to perform a One-way ANOVA on the post-test scores to test the hypothesis of no significant difference among any of the



groups. The post-test ANOVA also resulted in no significant difference among groups, which implied that participating in an aerobic dance program did not increase a woman's knowledge of fitness principles.

There are several possible explanations for this occurrence; one possible suggestion is that instructors did not use their class time to discuss theoretical fitness principles. Another possibility is that the fitness knowledge instrument was too strenuous to discriminate between differences in knowledge. The initial purpose of having a strenuous instrument was to allow for improvement between the pre- and post-tests.

It is possible, also, that because there was no significant difference found between any of the groups, aerobic dance participants were not motivated or interested in obtaining more knowledge of fitness principles. Their purpose in attending the class may have been, for example, only to lose weight or, to improve their cardiovascular endurance.

Participants in the study were asked to indicate on the post-test instrument where they obtained the majority of their knowledge of fitness principles. Participants were given the following choices: dance exercise, magazines, newspapers, television, fitness books, and other. Results from a frequency tally indicated that the majority of females participating in certified aerobic dance programs received their information from the instructor. The

remaining groups, which included the non-certified and control groups, indicated the majority of their information was obtained through magazines, followed by newspapers and television. Unfortunately, these sources of information are not always accurate; however, information disseminated to students from instructors with reputable certification should be accurate.

The pre-test and post-test means for the certified aerobic dance instructor's programs were slightly higher than the means for the control groups. This difference could be attributed to a stronger interest in fitness knowledge among women participating in aerobic dance than among women not participating in aerobic dance.

The addition of an AFAA certified instructor's program in the study might have affected the results when comparing the certified instructor's groups with the uncertified instructor's group. Because the two certified group's mean scores were slightly higher than the other group's means, adding another certified program to the group might have made enough of a difference to result in statistical significance.

On the other hand, using more than one non-certified group in the study could have also affected the results. The non-certified group consisted of an aerobic dance class conducted at an expensive, private health club. Including an aerobic dance class from a less expensive health club facility might have lowered the mean test scores. Among the

reasons why this might have been a factor is that possibly, the less-expensive clubs have less qualified instructors. Also, higher income appears to be associated with a higher level of intelligence.

In addition to the non-certified group's effect on the results, it is possible that a more diverse control group could have enhanced the study. The control group consisted of college faculty and university students, which indicates that every member of the study's control group had advanced education. If the sample were to have included, for example, all educational levels this could have lowered the mean score, which in turn could have resulted in a significant difference between the groups.

#### Summary of Results

The purpose of this study was to determine the effect of an instructor's certification on the female participant's knowledge of fitness principles in an aerobic dance program. A pre- and post-fitness knowledge test was administered to four groups of subjects, including a control group of non-participants in aerobic dance programs, and three experimental groups of aerobic dance participants.

A One-way ANOVA was performed on the test scores to determine if there was a significant difference among any of the groups. In addition, a t-test was used to compare the certified instructor's programs with the non-certified instructor's program. The results of the data obtained from

both the One-way ANOVA and the t-test revealed that an instructor's certification program did not significantly effect the aerobic dance participant's knowledge of fitness principles.

## CHAPTER V

### CONCLUSIONS, RECOMMENDATIONS, AND SUMMARY

The term, "aerobics," gained popularity in 1968 after Dr. Kenneth Cooper published a book by the same name ... Aerobics. Aerobic workouts were established to develop the cardiovascular system and initially, the workouts consisted of swimming, walking, running, or bicycling. In 1969, however, Jackie Sorenson invented aerobic dance to provide an enjoyable, yet beneficial medium for developing cardiovascular endurance. The idea was extremely popular, and today there exist many aerobic dance programs nationwide, as well as many improvisations of the original program.

Studies have been undertaken to prove that aerobic dance is physiologically beneficial. Testing has shown that aerobic dance can improve cardiovascular endurance, decrease percent body fat, improve self-image, tone muscles and improve flexibility. However, within the past three years, there has been an increased concern regarding injuries associated with aerobic dance. Much of the literature has placed the blame on unqualified instructors and has suggested instructor certification as a solution. This has

encouraged more research in the area of instructor's certification programs and more specifically, studies concerned with the incidence of injuries among instructors and participants. The topic of this study was concerned with the effect of the certification process. The purpose of this study was to determine the effect of an instructor's certification on the female participant's knowledge of fitness principles in an aerobic dance program.

### Conclusions

Within the limits of this study and based on the null hypothesis stated, the following conclusion was made:

1) THERE WILL BE NO SIGNIFICANT DIFFERENCES IN KNOWLEDGE OF FITNESS PRINCIPLES AMONG FEMALES PARTICIPATING IN IDEA INSTRUCTOR'S AEROBIC DANCE PROGRAMS, ACSM INSTRUCTOR'S AEROBIC DANCE PROGRAMS, NON-CERTIFIED INSTRUCTOR'S AEROBIC DANCE PROGRAMS, AND FEMALES NOT PARTICIPATING IN AN AEROBIC DANCE PROGRAM. No significant differences were found between any of the groups; therefore, the null hypothesis could not be rejected.

2) THERE WILL BE NO SIGNIFICANT DIFFERENCE IN KNOWLEDGE OF FITNESS PRINCIPLES BETWEEN FEMALES PARTICIPATING IN CERTIFIED AEROBIC DANCE INSTRUCTOR'S PROGRAMS (ACSM AND IDEA) AND A NON-CERTIFIED AEROBIC DANCE INSTRUCTOR'S PROGRAM (SKYLINE HEALTH CLUB). No significant difference was found between the certified and non-certified

groups; therefore, the null hypothesis could not be rejected.

Based on the above findings, it was concluded that aerobic dance instructor's certification does not significantly affect the participant's knowledge of fitness principles in an aerobic dance program.

#### Recommendations

The following are recommendations for future study related to aerobic dance certification.

1. A fitness knowledge study with samples from AFAA and YMCA instructor's certification programs, as well as the other major instructor's certification programs, is recommended.
2. Another fitness knowledge study using only men and/or women who are participating in an aerobic dance program for the first time is recommended.
3. It is recommended that a study take place to compare fitness knowledge of various other dance exercise participants such as jazzercise, aquaexercise, and slimmastics.
4. It is recommended that a study be conducted to determine the significance of certification on the fitness knowledge of the instructor.
5. A future study is recommended to compare aerobic dance injuries of the instructors and participants and the

type certification program, if any, with which the instructor is associated.

6. Few low-impact aerobic dance studies have taken place because of the relative newness of this type of exercise; it is recommended a comparison could be made between the significance of injuries in low- and high-impact aerobics.

7. A study which would compare a participant's injuries sustained during aerobic dance with her/his amount of fitness knowledge is recommended.

8. It is recommended that a study be conducted to determine the educational background of certified instructors.

#### Summary

There are over 50 aerobic dance certification programs that exist today. However, there have been no studies reported in the literature that indicate whether certification of aerobic dance instructors will benefit or not benefit the participants. This study examined the components of two of the major certification programs, IDEA and ACSM. These programs were used to determine the effect of an instructor's certification on the female participant's knowledge of fitness principles in an aerobic dance program.

Through training in a sound certification program an instructor should be able to utilize the fitness principles in his/her class and also report these principles to these



constituents as well. Certification programs can provide the foundation for effective aerobic dance classes by providing reliable and sound information and methods of exercise for producing physiological effects such as muscle tone and cardiovascular fitness.

Ultimately, an individual's health is her/his own responsibility, however, health can be enhanced by awareness. That awareness should be made possible by qualified instructors who will impart correct fitness principles information to their students. Aerobic dance is popular because it is an enjoyable method of exercise; however, for aerobic dance to maintain this popularity, the program must also be safe. Additional research is needed to determine which certification programs are most effective and most beneficial to the aerobic dance participant. Perhaps a national certification certificate will eventually be developed.

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## APPENDIXES



APPENDIX A  
FIELD TEST INSTRUMENT

FITNESS KNOWLEDGE TEST

Directions: Please read each statement carefully. Circle "T" for True answers and "F" for False answers. If you are uncertain or do not know an answer, circle DK. Please do not guess.

Example: T F DK Jogging is an aerobic exercise.

TRUE - FALSE - DON'T KNOW

- T F DK 1. The most accurate and practical method for determining what percent of your body is fat is the skinfold caliper test.
- T F DK 2. Your diet should include extra protein if you are exercising to increase your muscular strength.
- T F DK 3. Hardening of the arteries is called arteriosclerosis.
- T F DK 4. Heat stroke is a very serious condition characterized by red, hot, and dry skin.
- T F DK 5. If you sweat profusely during an exercise class, it is best to take salt tablets.
- T F DK 6. One to two pounds per week is the usually recommended limit for safe, unsupervised weight loss.
- T F DK 7. One of the main objectives of the warm-up phase of an aerobic program is to reach your target heart rate.
- T F DK 8. The major source of energy for an exercise participant is protein.
- T F DK 9. The immediate proper treatment for a sprained ankle is to apply moist heat to the ankle.
- T F DK 10. Increasing the strength of your abdominal muscles can decrease your chances of getting lower back problems.

- T F DK 11. An obese female is one whose fat content exceeds 15%.
- T F DK 12. Arthritis is a form of rheumatism in which there is inflammation of the muscles.
- T F DK 13. An 8oz. glass of drinking water contains approximately 10 calories.
- T F DK 14. A diet high in unsaturated fats is associated with a high cholesterol level.
- T F DK 15. Injured muscles are said to be "sprained."
- T F DK 16. Liver cancer is one possible disease which may result from the use of anabolic steroids.
- T F DK 17. One of the best methods for warming-up is a slow jog.
- T F DK 18. Bowling is one of the least effective activities for developing cardiovascular fitness.
- T F DK 19. A good source of fiber is fish.
- T F DK 20. The recommended daily servings from the milk group is 2 for an adult.
- T F DK 21. It is dangerous to go into a hot sauna or steam room during the first 10 minutes after strenuous exercise.
- T F DK 22. Consuming too many vitamins may result in toxicity to your system.
- T F DK 23. The recommended procedure for the development of flexibility is fast, forceful bobbing.
- T F DK 24. Normal systolic blood pressure at rest should not exceed 140 millimeters of mercury.
- T F DK 25. In most cases, individuals with eating disorders are able to correct their problems without professional assistance.
- T F DK 26. Another term for "runner's knee" is chondromalacia.
- T F DK 27. To improve cardiorespiratory fitness, daily exercise is required.

- T F DK 28. Aerobic dance should be performed on a wooden or carpeted floor, as opposed to an underlying surface like concrete or carpet over concrete.
- T F DK 29. When dieting, breads and cereals should be eliminated from your diet because they contain excessive amounts of calories.
- T F DK 30. Aerobic dance shoes should have elevated heels.
- T F DK 31. The major causes of obesity are glandular problems.
- T F DK 32. The major problem associated with high consumption of salt is hypertension.
- T F DK 33. Endorphins are morphine-like substances released during intense exercise.
- T F DK 34. Height-weight charts take a person's percentile of body fat into consideration.
- T F DK 35. Muscular endurance is not directly associated with cardiovascular endurance.
- T F DK 36. Anaerobic activities generally are long-duration, low intensity activities.
- T F DK 37. The "Intensity" refers to the level of effort one puts into a physical activity.
- T F DK 38. Your maximum heart rate can be fairly accurately estimated by subtracting your age from 180.
- T F DK 39. The recommended minimum length of time one should exercise to achieve a training effect is 45 minutes.
- T F DK 40. The best advice for monitoring your body's adjustment to an exercise program is to be aware of how your body feels.
- T F DK 41. Men develop osteoporosis earlier than women.
- T F DK 42. Jogging in below freezing temperature may cause the lungs to become frostbitten.
- T F DK 43. Over the long term, regular and consistent exercise will increase your metabolic rate.

T F DK 44. Body wraps are effective in promoting permanent weight loss.

T F DK 45. Exercise participants should avoid drinking water during a work-out.

Which of the following is your primary source of fitness information? (Check one)

\_\_\_\_\_ Dance exercise

\_\_\_\_\_ Television

\_\_\_\_\_ Magazines

\_\_\_\_\_ Fitness books

\_\_\_\_\_ Newspapers

\_\_\_\_\_ Other

VITA

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Thesis: THE EFFECTS OF AN INSTRUCTOR'S CERTIFICATION ON  
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