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**Selected Physiological Changes in College Men and Women  
Participating in Social Dance**

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SELECTED PHYSIOLOGICAL CHANGES IN COLLEGE  
MEN AND WOMEN PARTICIPATING IN  
SOCIAL DANCE

BY

BARBARA DALE BOVEE

A thesis submitted  
in partial fulfillment of the requirements for the  
degree Master of Science, Major in  
Physical Education, South Dakota  
State University

1971

SELECTED PHYSIOLOGICAL CHANGES IN COLLEGE

MEN AND WOMEN PARTICIPATING IN

SOCIAL DANCE

This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable as meeting the thesis requirements for this degree, but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Adviser

✓ Date

Head, Physical Education  
Department

✓ Date

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## CHAPTER I

### INTRODUCTION

#### Significance of the Study

The value of social or ballroom dance has been accepted as being social in nature and the literature on the subject upholds this contention. Page reports that the dance is commonly thought of by the laity as a popular form of amusement, combining social and physical elements, but appealing solely to the "frivolous mood." History reveals that dance has played various roles in the lives of people of every age and culture. Before man arrived at the stage of reflective thinking, it was his chief mode of expressing delight and interest, for the individual as well as the tribe.<sup>1</sup>

Man is a dancing animal, and has always used the dance as a vehicle for the expression of impulse and emotion. Even when man arrived at the reflective stage of development, and when the sciences and formal art appeared, the dance did not disappear, but merely took on a new form. Dance has continued to be a language, which like music is an emotional expression of the whole personality. Dance is one of the arts of self-expression.<sup>2</sup>

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<sup>1</sup>Barbara Page, "Philosophy of the Dance," The Research Quarterly, 9:5, May, 1933.

<sup>2</sup>Ibid., p. 6.



Dance has evolved through the ages into many forms, and one of these is social dance. Man has recognized the value of dance and has included it as a part of his educational system. Brownell and Hagman stated:

The dance in its various forms serves well the purpose of education: it develops the body; it challenges the intellect; it broadens the social horizons of the individual; it stimulates the imagination of the performance of purposeful and creative activities; it releases emotional tension. The dance then becomes, not an end in itself, but a means of obtaining harmonious growth and development of self.<sup>3</sup>

Dance, when well taught, makes two unique contributions to education. First, it carries within its own form the necessity for creativity, and second, it demands self-discipline. Dance in addition demands interest, enthusiasm, and finally, dedication to a form whose chief concern lies in constructing something whole in an era when destruction is a more common pattern.<sup>4</sup>

Margaret H'Doubler, who established the first major dance program in the country, stated the value of dance in relation to the aim of modern education to be:

The freest and fullest development of the individual based upon a scientific understanding of his physical, mental, spiritual, and social needs. Dance helps to develop the body to cultivate the love and appreciation of beauty, to stimulate the imagination, and

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<sup>3</sup> Clifford Lee Brownell and Patricia E. Hagman, Physical Education--Foundations and Principles (New York: McGraw-Hill Book Co., Inc., 1951), p. 146.

<sup>4</sup> Katherine Dickson, "Introduction to the College Directory," Dance Magazine, 27:39, November, 1953.

challenge the intellect, to deepen and refine the emotional life, and to broaden the social capacity of the individual that he may at once profit from and serve the greater world outside.<sup>5</sup>

People dance mainly for diversion and entertainment. The social atmosphere provides dancers with a means of meeting people, renewing friendships, and demonstrating skill, all in an environment that is conducive to recreation and fun. Social dancing has no age barriers.<sup>6</sup>

Because of its wide variety of forms, social dancing provides physical activity ranging from moderate, as in a foxtrot or rumba, to vigorous, as in discotheque dancing, which is so active that it compares favorably in terms of energy expenditure to sports like tennis or swimming.<sup>7</sup> Also social dancing encourages the learning of exercise of such physical skills as movement to a definite rhythm, good posture, and neuromuscular coordination.<sup>8</sup>

Because of its coeducational nature, social dancing provides an excellent opportunity to establish and maintain a healthy attitude toward the opposite sex. In the social dance situation, people are generally more conscious of their manners and the ordinary common sense rules of etiquette. Awareness, respect, and concern for the feelings of others are often evident in this environment. While dancing offers no

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<sup>5</sup>Margaret H'Doubler, The Dance and Its Place in Education (New York: Harcourt, Brace and Company, 1925), p. 31.

<sup>6</sup>Seymour Kleinman, Social Dancing Fundamentals (Columbus: Charles E. Merrill Publishing Company, 1956), p. 1.

<sup>7</sup>Ibid., p. 1.

<sup>8</sup>Ibid., p. 2.

guarantee that these values will emerge, it provides an atmosphere in which they may be encouraged and practiced.<sup>9</sup>

Dance is usually a part of the physical education curriculum which is concerned with movement education. Hall reports Lois as stating:

In our great concern for dance as an art form we sometimes get separated from the practical aspects of movement education and forget that dance movement is not different than movement. It is true that dance is primarily an art form, but it is also made up of certain discipline, physical skills, and devices that could well be integrated with other activities within the general physical education curriculum.

Dance is by no means only an artistic appendage to the functioning part of the physical education program, but an integral and vital segment of the movement educational program. Both the dance and sports program emphasize elements common to us all in our everyday activities. The contribution of dance training to physical fitness can be as beneficial to the individual as any sport activity taught in the physical education program. Technically, dancing is limited only by the range and capacity of the body for movement, which requires intensive muscular training and wide variation in movement, control, strength, elasticity, and breath control.<sup>10</sup>

Little statistical information can be found to adequately identify the physiological effects of the dance on participants. Other immeasurable factors related to the artistic nature of dance make it very difficult to determine what it is that separates the dancer from the skilled performer in other areas or the exceptional dancer from the unexceptional. Since the technique of the dancer does depend upon his movement skill, this then provides a basis for research possibilities.

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<sup>9</sup>Ibid.

<sup>10</sup>Bobbie Hall, "The Effects of Modern Dance Training on Selected Tests of Fitness" (unpublished Master's Thesis, University of Toledo, 1961), pp. 32-33.

Contemporary social dance is an evolving form participated in chiefly for the purpose of pleasurable social interaction.<sup>11</sup> Social dance has been considered more for social or psychological value than for any physical values. What are some of the physical values that a dancer gains while in a social dance course? It was toward this end that the present study was directed.

### Statement of the Problem

The purpose of this investigation was to study the physiological effects of social dance on selected bodily responses of freshman male and female students at South Dakota State University. The selected bodily responses investigated were dynamic balance, static balance, trunk flexibility, agility, leg power, and leg strength.

### Hypothesis

During the course of this investigation there is no significant change in (1) dynamic balance, (2) static balance, (3) trunk flexibility, (4) agility, (5) leg power, and (6) leg strength of students enrolled in social dance classes at South Dakota State University.

### Limitations and Delimitations

1. The subjects for this study were students registering for social and square dance classes during the spring semester of 1971 in basic physical education. Subjects participating in outside strenuous activities were eliminated from this study.

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<sup>11</sup>Beverly H. Yerrington and Tressia A. Outland, Social Dance (Palo Alto: National Press, 1961), p. 1.

2. The control group consisted of volunteer freshmen registering for archery classes during the spring semester of 1971 in basic physical education. Subjects participating in outside strenuous activities were eliminated from the control group.

3. Only 19 male and 31 female freshman volunteer students in social dance classes and 14 male and 12 female freshman volunteer students in archery classes were chosen as subjects.

4. The duration of this study was from February 5 to April 2, 1971, a total of eight weeks.

5. The pre test was administered on February 5 and the post test on April 2, 1971.

6. Only the Foxtrot, Cha Cha Cha, Waltz, Lindy, Bossa Nova, Schottische, Polka, and Fad or Discotheque dancing were taught to the experimental group.

7. Only physiological parameters of dynamic balance, static balance, trunk flexibility, agility, leg power, and leg strength were tested and were done so in the order listed.

### Definition of Terms

Agility. "Agility is the physical ability which enables an individual to rapidly change body positions and direction in a precise manner."<sup>12</sup>

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<sup>12</sup>Barry L. Johnson and Jack K. Nelson, Practical Measurements for Evaluation in Physical Education (Minneapolis: Burgess Publishing Company, 1970), p. 100.

Balance. Balance can be classified into two types, static balance or dynamic balance. "Static balance may be defined as the physical ability which enables an individual to hold a stationary position."<sup>13</sup> "Dynamic balance is the ability to maintain balance during vigorous movement."<sup>14</sup>

Flexibility. "Flexibility is the ability of an individual to move the body and its parts through as wide a range of motion as possible without undue strain to the articulations and muscle attachments."<sup>15</sup>

Power. "Power is the ability to release maximum muscular force at maximum speed."<sup>16</sup>

Strength. "Strength is the capacity of the individual to exert muscular force."

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<sup>13</sup>Ibid., p. 157.

<sup>14</sup>Ibid.

<sup>15</sup>Ibid., p. 198.

<sup>16</sup>Harold M. Barrow and Rosamary McGell, A Practical Approach to Measurement in Physical Education (Philadelphia: Lea and Febigen, 1964), p. 116.

## CHAPTER II

### REVIEW OF THE RELATED LITERATURE

The search for related literature revealed few studies which attempted to evaluate physiological effects and changes in bodily responses as a result of participation in social dance. Discussed in this chapter are studies concerning the physiological effects of other types of dance such as folk, square, modern, social, and tap.

Cheney in his study took skilled performers in three areas-- dance, gymnastics, and sports activities--and tested them on a battery of selected balance tests to determine whether specific balance training is a factor in ability to balance.<sup>1</sup> Cheney's conclusions were as follows:

1. The skilled performers with specific balance training were significantly better than skilled performers with no specific balance training on dynamic and static balance as measured by the Sideward Step Test and Balance Test Lengthwise and Blind-folded.
2. Dance group was significantly better than the gymnast and the sport group in static balance side to side.
3. There was a low correlation between general motor ability and general balance ability.

Bradford investigated the effect of a creative dance program on the physical fitness level of mentally retarded girls at Denton State

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<sup>1</sup>Kay M. Cheney, "A Comparison of Three Groups of Skilled Performers on a Battery of Selected Tests of Balance" (Microcard Master's Thesis, University of Iowa, 1965), p. 32.

School, Denton, Texas. Mentally retarded subjects in creative dance program improved significantly in flexibility, bodily strength, and cardio-vascular endurance.<sup>2</sup>

Bennet conducted an experiment with 79 college freshmen to determine the relative contribution of modern dance, folk dance, basketball, and swimming to selected and general motor abilities. Bennet concluded in general that at the end of sixteen weeks and thirty-two periods of instruction the relative status of the four activities in the development of specific and general motor ability of college freshman women was swimming and modern dance, basketball, and folk dance, in the order listed.<sup>3</sup>

Grove measured the changes occurring in individuals taking tap dance activities for 35-minute periods, three times per week, for eight weeks. Significant increases were found in ankle strength and flexibility, but no significance was found in pulse recovery rate or explosive power.<sup>4</sup>

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<sup>2</sup>Minnie M. Bradford, "A Study of the Effects of Creative Dance Program on the Physical Fitness Level of Mentally Retarded Subjects at Denton State School, Denton, Texas" (unpublished Master's Thesis, North Texas State University, 1967), p. 39.

<sup>3</sup>Collene L. Bennet, "Relative Contributions of Modern Dance, Folk Dance, Basketball, and Swimming and Motor Abilities of College Women," The Research Quarterly, 27:261, October, 1950.

<sup>4</sup>Geraldine A. Grove, "The Effects of Participation in Tap Dancing on Certain Motor Abilities of College Women" (unpublished Master's Thesis, The Pennsylvania State University, 1961), p. 36.



Mohr measured the changes occurring in individuals from various activities during one semester and found significant improvement in means of scores on the sit-up test, the pull-up test, and a bouncing test, after a semester of work in the activity of dance.<sup>5</sup>

Hall in her study tested 12 students in modern dance, 19 students in social dance, and 23 students in sports activities for flexibility, strength, and endurance. The tests for flexibility were back extension and back flexion. A sit-up test measured strength; the step test measured endurance. Students met for 45-minute periods twice a week for 12 weeks. Subjects were given pre and post tests on the three parameters of flexibility, strength, and endurance. Hall found that modern dance was capable of significantly improving fitness in areas of flexibility and muscular strength. Social dance was capable of improving fitness in areas of flexibility and muscular strength; in addition, the group in social dance was the only one to show significant improvement in cardiovascular fitness by the step test.<sup>6</sup>

Bushey in 1966 examined the relationship of modern dance performance to agility, balance, flexibility, power, and strength.

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<sup>5</sup>Dorothy R. Mohr, "The Measurement of Certain Aspects of the Physical Fitness of College Women," The Research Quarterly, 15:340-349, December, 1944.

<sup>6</sup>Bobbie Hall, "The Effects of Modern Dance Training on Selected Tests of Fitness" (unpublished Master's Thesis, University of Toledo, 1961), pp. 32-33.

Her results showed a significant correlation between modern dance performance and power and strength.<sup>7</sup>

Brownlee measured the energy cost of doing the Charleston and the Twist on 21 female subjects. Dancing the Charleston expends significantly more energy ( $P = 0.01$ ) than dancing the Twist. The Charleston expends 6.136 times more energy than resting, whereas the Twist expends 4.86 times more energy than resting.

Neppel studies the effects of modern dance participation on balance in freshman football players by pre and post testing an experimental and a control group. The Stork Stand was used as the measure of balance. Results of the study led to the conclusion that modern dance increases body balance in college freshman football players.<sup>9</sup>

The literature reviewed did not reveal an adequate number of studies in the area of social dance for conclusive evidence of agreement or disagreement as to the physiological values obtained after participating in dance. The one study reviewed which involved social dance did reveal significant physiological improvements.

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<sup>7</sup>Suzanne R. Bushey, "Relationship of Motor Dance Performance to Agility, Flexibility, and Strength," *The Research Quarterly*, 37:313-316, October, 1966.

<sup>8</sup>Patricia Ann Brownlee, "Energy Cost of Selected Popular Dance" (unpublished Master's Thesis, Washington State University, 1966), p. 23.

<sup>9</sup>Ina Temple, "Balance: A Review of Literature," *The University of Toledo: Learning and Physical Education Newsletter*, 5:10-11, Winter-Spring, 1971.

## CHAPTER III

### PROCEDURE

#### Source of Data

A total of 76 freshman students enrolled in basic physical education classes the spring semester, 1971, at South Dakota State University volunteered for this study. The experimental group consisted of 19 male and 31 female students enrolled in social dance classes which were taught by the investigator. The control group consisted of 14 male and 12 female students enrolled in two archery classes. The archery classes were chosen because it was felt that such an activity would not have an effect on the physiological parameters to be measured. Volunteer subjects in both groups participating in intercollegiate athletics were eliminated from the study. (See Appendix A, for survey sheet of activities students participate in during the school year). All subjects ranged in age from 17-20 years. Several subjects were also eliminated because of illness and participation in jogging or weight lifting activities. The majority of those subjects eliminated were males. This fact accounts for the lower number of males in the experimental group.

#### Organization of the Study

The duration of this study was from February 5, 1971, to April 2, 1971, a period of eight weeks. The subjects chosen for this study were volunteer students enrolled in social dance classes or archery classes. Subjects participated in their regularly scheduled

social dance classes or archery classes for two 40-minute periods per week (either Monday and Wednesday or Tuesday and Thursday) from 1:35 p.m. to 2:15 p.m.

Data were collected from two tests which were administered to the subjects on February 5, 1971, and April 2, 1971. The subjects were scheduled for testing at their convenience, and tests were administered on the test dates by the investigator and seven graduate assistants in the Department of Health, Physical Education and Recreation.

#### Administration of the Treatment

Subjects in social dance classes were taught nine types of social dance by the investigator. The control group were engaged in regular archery participation. The nine types of social dance--Foxtrot, Cha Cha Cha, Waltz, Bossa Nova, Polka, Schottische, Lindy, Charleston, and Fad dances--were selected and taught by the investigator. A list of the types of social dances and variations are found in Appendix B. Fad or discotheque dances were taught as a type of social dance because of their current popularity with this age group.

Fad or discotheque dances are seldom presented in text books because the steps are not standardized and neither are the names of such dances, which vary from one locality to another. Most of the fad or discotheque dances are a rehash of other social dances, with some aspects going back to 1920.<sup>1</sup>

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<sup>1</sup>Beverly H. Yerrington and Tressia A. Outland, Social Dance (Palo Alto: National Press, 1961), p. 1.

For review of fad or discotheque dances, subjects were divided into groups who supplied their own music and taught variations of the dances. (See Appendix C, for types of discotheque or fad dances taught and music used in alphabetical order).

Music used in regular class sessions of social dance were selected from a list compiled by the investigator. (See Appendix D, for the music used in alphabetical order). A total of fifteen lessons in social dance and archery classes were completed. (See Appendix E for summary of lessons taught in social dance).

Only fifteen lessons were taught in the eight-week period because of a student walk-out at South Dakota State University, in protest to the proposed elimination of the removal of the College of Engineering from South Dakota State University. Subjects who were unable to attend their regularly scheduled classes, attended other class sessions. Hence, the amount of time spent in social and archery classes was the same for all subjects.

The physiological parameters investigated in this study and the tests used were as follows: dynamic balance--Bass Stepping Stone Test; static balance--Bass Stick Test (Crosswise); trunk flexibility--Modified Sit and Reach Test; agility--Right Boomerang Run; leg power--Vertical Power Jump; and leg strength--Medart Dynamometer. The pre test and the post test procedures were conducted in the same manner, and the tests were given in the order listed above. The following is a description of the tests employed for the collection of data.

Dynamic balance. The Bass Stepping Stone Test was employed to measure dynamic balance.<sup>2</sup> Circles, eleven in number and 8 1/2 inches in diameter, were drawn on the floor. The subjects stood with the right foot in the starting circle and leaped into the first circle with the left foot, into the second circle with the right foot, and so on, alternating the feet from circle to circle. Subjects were given one trial, and the score was recorded. (See Appendix N, for diagram).

Scores were 50, plus the number of seconds taken to negotiate the test, and minus three times the "errors." The "errors" included the following: (1) touching the heel to the floor; (2) moving the foot while standing in the circle; (3) hopping upon the supporting foot; (4) touching the floor outside the circle; (5) touching the floor with the opposite foot; and (6) touching the floor with any other part of the body. Each error counted one penalty point. Raw totals appear in Appendix F.

Static balance. To measure static balance, the Bass Stick Test (Crosswise) as suggested by Johnson and Nelson was employed.<sup>3</sup> Johnson and Nelson reported the reliability to be as high as .90.<sup>4</sup> A one-inch wide, one-inch high, and twelve-inch long stick was used. The

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<sup>2</sup>Ruth I. Bass, "An Analysis of the Component Test of Semi-Circular Canal Functions of Static and Dynamic Balance," The Research Quarterly, 10:23-52, May, 1939.

<sup>3</sup>Barry L. Johnson and Jack K. Nelson, Practical Measurements for Evaluation in Physical Education (Minneapolis: Burgess Publishing Company, 1970), p. 160.

<sup>4</sup>Ibid.

directions were thoroughly explained to the subjects, and each subject was encouraged to do his best. Six trials were given, three on the left foot and three on the right foot, and data recorded.

On the starting signal, the subject lifted the left leg and stood on the ball of the right foot on the stick as long as he could. The investigator timed up to sixty seconds, using a stop watch. A perfect score on both of these tests was sixty. The investigator noted the time when the performer stepped off the stick or touched the floor with any part of his body. Separate scores for each of the six trials were recorded from the start until the subject touched the floor or remained on the stick for 60 seconds. The six scores were totaled and recorded. Raw totals appear in Appendix G.

Flexibility of the trunk. To measure flexibility of the trunk, the Modified Sit and Reach Test was used to test the flexion of the hip and back as well as the elasticity of the hamstring muscles.<sup>5</sup> The test has been recorded as having a validity and a reliability of .92.<sup>6</sup> Equipment needed was a yardstick. The subject assumed a sitting position on the floor with the legs extended at right angles to a line drawn on the floor. A yardstick was placed on the floor between the legs of the subject with the fifteen-inch mark resting on the near edge of the heel line. Heels were five inches apart. The investigator's feet were used to brace the subject's feet so that on the reach

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<sup>5</sup>Ibid., p. 199.

<sup>6</sup>Ibid.

the heels would not slip over the line. The subject bobbed forward three times and then reached with both hands as far forward as possible on the yardstick. The subject's score was the best score of the three trials to the nearest quarter of an inch. (See Appendix H, for raw data).

Agility. To measure agility, the Right Boomerang Run, as suggested by Johnson and Nelson, was employed.<sup>7</sup> This test has been reported as having a reliability as high as .93 for boys and .912 for girls and a validity as high as .82 for boys and .72 for girls.<sup>8</sup> The equipment needed was one chair for the center station and four Indian clubs, one stop watch, and marking tape. (See Appendix I, for diagram).

On the signal "Go," the subject ran from behind the starting line to the center station, made a quarter right turn and continued around the Indian club to the center station, made a quarter right turn and continued around the Indian club to the center station, made another quarter right turn and continued around the Indian club to the center station, made the last right turn, and ran across the finish line.

The score was determined by the time taken to complete one complete course to the nearest tenth of a second. One tenth of a second was taken off the score for each object touched at the various stations. Subjects were allowed to jog through the course once. The tester stressed running across the finish line as hard as possible. Data were recorded in tenth of seconds and are reported in Appendix I.

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<sup>7</sup>Ibid., p. 109.

<sup>8</sup>Ibid.



Leg power. To measure leg power the Vertical Power Jump as suggested by Johnson and Nelson was employed.<sup>9</sup> Johnson and Nelson report a validity of .989 and a reliability of .977.<sup>10</sup> The equipment needed was a jump board marked off in half inches, chalkdust, and a weight scale.

The subjects without shoes were weighed and then assumed a standing position facing sideways to the jump board. One hand was behind the subject's back, holding the top of the gym shorts. The other hand was extended outward with fingers extended. The subject stood as tall as possible on the toes and reached as high as possible with the extended hand. Height was measured where the middle finger touched the jump board. The subject with middle finger dusted with chalk assumed a full squat position with the head and back erect and body balanced. On command the subject jumped as high as possible (using only the legs) and touched the jump board at the top of the jump with the middle finger. Jumps were disregarded if balance or position was lost. Three trials were allowed, and on the last trial the investigator said, "This is your last jump. Try to beat your last two jumps." Measurement was the distance between the mark of extended arm and the mark of the highest jump to the nearest 1/2 inch. The measurement of the best jump was

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<sup>9</sup>Ibid., p. 91.

<sup>10</sup>Ibid.

converted to foot pounds by multiplying distance covered by the subject's body weight and then divided by twelve:

$$\frac{\text{Distance X Body Weight}}{12} = \text{_____ foot pounds}^{11}$$

Raw scores appear in Appendix K.

Leg strength. To measure leg strength in this study the method suggested by Meyers and Blesh was employed.<sup>12</sup> The validity of this method has been reported as .79 and a reliability of .831.<sup>13</sup> A Medart-Dynamometer mounted on a Medart bench, 12 1/2 inches wide, 22 inches long, and 13 inches high, has an adjustable chain, a 20-inch-long taped handle, and a webbed belt.

The subject stood with his feet parallel and about six inches apart. The back was erect with knees bent to an angle of 120 degrees at the knee joint. A Goniometer was employed to measure the angle of flexion of the legs. A cotton belt attached to one end of the bar was placed around the subject's hips in a comfortable position, and the belt was wrapped around the other end of the bar. The bar rested upon the subject's thighs, and the subject looked straight forward. On command the subject steadily extended the legs while the hands grasped the bar. For safety, the subject was instructed to keep the back erect at all times.

<sup>11</sup>Ibid.

<sup>12</sup>Carlton R. Meyers and T. Ervin Blesh, Measurements in Physical Education (New York: Ronald Press Company, 1962), p. 232.

<sup>13</sup>Ibid.

The best score of the three trials was recorded for statistical analysis. Data were recorded in pounds pulled. Raw scores appear in Appendix L.

### Procedure of Collecting Data

All the testing was conducted at the South Dakota State University Gymnasium, the Human Performance Laboratory, and the Dance Studio. On the day of testing, the subjects reported to the gymnasium in gym shorts and tennis shoes and the following procedure was employed.

1. A general overview of the study was presented to the subjects as they moved from test to test. Each test was administered by a different tester.
2. Tests were administered by the investigator and seven graduate assistants who had been thoroughly trained in the administration of his test.
3. Techniques for the various tests were explained and demonstrated by each tester at this testing station.
4. Each tester administered the same pre and post test, and the same procedures for both tests were closely followed.
5. The pre test was given on February 5, 1971, and the post test on April 2, 1971.
6. Score sheets employed for the collection of data appear in Appendix M.

## CHAPTER IV

### ANALYSIS AND DISCUSSION OF RESULTS

#### Organization of the Data for Analysis

The purpose of this investigation was to study the physiological effects of social dance on the following selected bodily responses: dynamic balance, static balance, agility, trunk flexibility, leg power, and leg strength.

The data from the study were organized in a manner which permitted the statistical procedure of analysis of covariance to be applied.<sup>1</sup> A total of seventy-six freshman students who were enrolled the spring semester, 1971, at South Dakota State University volunteered for this study. The experimental group consisted of nineteen male and thirty-one female students enrolled in social dance classes which were taught by the investigator. The control group of fourteen male and twelve female students were enrolled in two archery classes.

An analysis of covariance F-ratio was computed to determine only the significance of the difference in the changes between the females in the experimental group and the females in the control group; the same procedure was followed for the males in both groups. The data used for analyses were obtained from measurements of parameters of dynamic balance, static balance, trunk flexibility, agility, leg power, and leg strength. The .05 level of confidence was accepted as the minimum level necessary for the F-ratio to be considered significant. The group means for the six parameters appear in Table I. The raw data for the subjects appear in Appendix F, G, H, J, K, L.

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<sup>1</sup>Jerome C. Weber and David R. Lamb, Statistics and Research in Physical Education (Saint Louis: The C. V. Mosby Company, 1970), p. 146.

TABLE I

## GROUP MEANS FOR THE SELECTED PARAMETERS ON THE SIX TESTS

Parameters	Groups	Test I	Test II
Dynamic Balance Bass Stepping Stone	Experimental		
	Boys	83.74	90.48
	Girls	81.73	89.81
	Control		
	Boys	79.57	80.38
	Girls	82.70	81.09
Static Balance Bass Stick Test (Crosswise) (Seconds)	Experimental		
	Boys	29.67	31.46
	Girls	25.75	29.57
	Control		
	Boys	31.22	29.59
	Girls	25.39	27.55
Trunk Flexibility Modified Sit and Reach (Inches)	Experimental		
	Boys	18.66	19.20
	Girls	17.57	18.11
	Control		
	Boys	15.48	15.66
	Girls	17.38	17.10
Agility Right Boomerang Run (Seconds)	Experimental		
	Boys	13.55	13.28
	Girls	16.44	15.59
	Control		
	Boys	13.68	15.53
	Girls	15.81	15.54
Leg Power Vertical Power Jump (Foot Pounds)	Experimental		
	Boys	177.62	184.62
	Girls	89.32	94.62
	Control		
	Boys	180.69	184.71
	Girls	84.84	85.19
Leg Strength Medart- Dynamometer (Pounds)	Experimental		
	Boys	773.42	1007.90
	Girls	548.39	616.13
	Control		
	Boys	932.86	852.14
	Girls	517.50	489.17

## Analysis of Data

The results of the analysis of covariance analyzing the changes for girls on all parameters from the pre test (Test I) to the post test (Test II) are shown in Table II.

TABLE II  
ANALYSIS OF COVARIANCE FOR ALL THE PARAMETERS  
OF THE FEMALE SUBJECTS

Parameters	Source of Covariance	SS*	df	MS**	F***
Dynamic Balance	Treatment	739.53	1	739.53	20.70
	Error	1428.81	40	35.72	
Static Balance	Treatment	21.99	1	21.99	.185
	Error	4750.13	40	118.75	
Trunk Flexibility	Treatment	6.08	1	6.08	3.61
	Error	67.29	40	1.68	
Agility	Treatment	1.07	1	1.07	2.69
	Error	15.94	40	.40	
Leg Power	Treatment	280.63	1	280.63	1.98
	Error	5676.92	40	141.92	
Leg Strength	Treatment	86542.84	1	86542.84	8.23
	Error	420654.60	40	10516.66	

\*SS refers to corrected sum of squares

\*\*MS refers to corrected mean sum of squares

\*\*\* $F(1/40)_{.05} = 4.17$

There were significant differences between the control group and the experimental group in their changes from Test I to Test II in two of the six variables studied. The mean improvement in the experimental group from 81.73 to 89.81 in the Bass Stepping Stone Test was significantly better than the change in the control group of from 82.70 to 81.09. This was indicated by an F-ratio of 20.70 compared with the needed value of 4.17 for the .05 level of confidence.

The F-ratio for leg strength of 8.23 also indicated significant difference between the groups. An analysis of the means reveals that the experimental group increased from 548.39 pounds to 616.13, whereas the control group decreased in leg strength from 517.50 to 489.17 pounds.

The results of the analysis of covariance analyzing the changes from the pre test (Test I) to the post test (Test II) for males on all parameters are shown in Table III.

TABLE III

ANALYSIS OF COVARIANCE FOR ALL THE PARAMETERS  
OF THE MALE SUBJECTS

Parameters	Source of Covariance	SS*	df	MS**	F***
Dynamic Balance	Treatment	462.48	1	462.48	8.68
	Error	1598.21	30	53.27	
Static Balance	Treatment	84.05	1	84.05	.88
	Error	2856.40	30	95.21	
Trunk Flexibility	Treatment	5.45	1	5.45	2.13
	Error	76.81	30	2.56	
Agility	Treatment	.10	1	.10	.33
	Error	9.01	30	.30	
Leg Power	Treatment	2309.49	1	2309.49	5.37
	Error	12891.83	30	429.72	
Leg Strength	Treatment	613624.91	1	613624.91	15.88
	Error	1159595.88	30	38653.19	

\*SS refers to corrected sum of squares

\*\*MS refers to corrected mean sum of squares

\*\*\* $F(1/30)_{.05} = 4.08$



There were significant differences for the experimental group in their changes from Test I to Test II in three of the six variables studied. The mean improvement in the experimental group from 83.74 to 90.48 in the Bass Stepping Stone Test was significantly better than the change in the control group of 79.57 to 80.83. This was indicated by an f-ratio of 8.68 compared with the needed value of 4.08 for the .05 level of confidence.

The F-ratio for leg power of 5.37 indicated a significant difference between the groups. An analysis of the means reveals that the experimental group increased from 177.62 foot pounds to 184.62, whereas the control group decreased in leg power from 932.86 to 852.14 pounds.

### Discussion of Results

The results of the analysis of covariance for the female subjects indicated that the experimental group increased significantly over the control group in dynamic balance and leg strength. There was no significant difference, however, between the groups in static balance, agility, trunk flexibility, or leg power. The male experimental group increased significantly over the control group in dynamic balance, leg power, and leg strength. There was no significant difference between the groups in static balance, agility, or trunk flexibility.

In this study both the male and female groups increased significantly in dynamic balance. Cheney's study found that skilled performers with specific balance training were significantly better than skilled

performers with no specific balance training on dynamic balance as measured by Sideward Step Test.<sup>2</sup>

Both groups in this study did not increase significantly in static balance. Bushey's study concluded that there was no significant correlation between modern dance and static balance as measured by a stick test.<sup>3</sup> Neppel's study showed that participation in modern dance by football players did lead to an increase in body balance or static balance.<sup>4</sup> Cheney's study found the dance group to be significantly better than the gymnast and sport group in static balance.<sup>5</sup>

In this study, both groups increased in trunk flexibility, but not at the .05 level of confidence. Bradford's study of mentally retarded girls in creative dance programs found that they significantly improved in flexibility as measured by floor touches and back extension test.<sup>6</sup> Grove's study in tap dance found significant increase in ankle

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<sup>2</sup>Kay M. Cheney, "A Comparison of Three Groups of Skilled Performers on a Battery of Selected Tests of Balance" (Microcard Master's Thesis, University of Iowa, 1965), p. 32.

<sup>3</sup>Suzanne R. Bushey, "Relationship of Modern Dance Performance to Agility, Flexibility, and Strength," The Research Quarterly, 37:313-316, October, 1966.

<sup>4</sup>Ina Temple, "Balance: A Review of Literature," The University of Toledo: Learning and Physical Education Newsletter, 5:10-11, Winter-Spring, 1971.

<sup>5</sup>Cheney, loc. cit.

<sup>6</sup>Minnie M. Bradford, "A Study of the Effects of Creative Dance Program on the Physical Fitness Level of Mentally Retarded Subjects at Denton State School, Denton, Texas" (unpublished Master's Thesis, North Texas State University, 1967), p. 39.

flexibility.<sup>7</sup> Hall's study of social dance found significant increase in flexibility as measured in back flexion and extension.<sup>8</sup>

Both groups in this study improved in agility, but not at the .05 level of confidence. Bushey's study found no significant correlation between modern dance performance and agility.<sup>9</sup>

The boys in this study increased significantly in leg power; the girls, however, increased in leg power, but not at the .05 level of confidence. Grove's study in tap dancing found no significant increase in explosive power in a jump and reach test.<sup>10</sup> Bushey's study found significant correlation between modern dance performance and power as measured by the vertical jump.<sup>11</sup>

In this study, both groups increased significantly in leg strength. Grove's study in tap dance found that ankle strength increased significantly.<sup>12</sup> Mohr's study found an increase in abdominal and arm strength by the sit-up test and the pull-up test by participating

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<sup>7</sup>Geraldine A. Grove, "The Effects of Participation in Tap Dancing on Certain Motor Abilities of College Women" (unpublished Master's Thesis, The Pennsylvania State University, 1961), p. 26.

<sup>8</sup>Bobbie Hall, "The Effects of Modern Dance Training on Selected Tests of Fitness" (unpublished Master's Thesis, University of Toledo, 1961), pp. 32-33.

<sup>9</sup>Bushey, op. cit., p. 313.

<sup>10</sup>Grove, op. cit., p. 26.

<sup>11</sup>Bushey, op. cit., p. 313.

<sup>12</sup>Grove, op. cit., p. 26.

in dance.<sup>13</sup> Hall's study found significant increase in muscular strength by a sit-up test for abdominal strength.<sup>14</sup> Bushey's study found a significant correlation between modern dance and grip strength.

On the basis of the results and limitations, the following conclusion relative to the stated hypothesis was made.

1. The null hypothesis which stated that there is no significant change in dynamic balance, static balance, trunk flexibility, agility, leg power, and leg strength can not be totally accepted. The null hypothesis for both groups in regard to dynamic balance and leg strength was rejected. For the male subjects, the null hypothesis concerning leg power was rejected, but for females it was accepted. The null hypothesis for both groups in regard to static balance, trunk flexibility, and agility was accepted.

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<sup>13</sup>Dorothy R. Mohr, "The Measurement of Certain Aspects of the Physical Fitness of College Women," The Research Quarterly, 15:340-349, December, 1944.

<sup>14</sup>Hall, op. cit., p. 33.

## CHAPTER V

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### Summary

The purpose of this investigation was to study the physiological effects of social dance on the following selected bodily responses: dynamic balance, static balance, agility, trunk flexibility, leg power, and leg strength.

A total of seventy-six freshman students who were enrolled in the spring semester, 1971, at South Dakota State University volunteered for this study. The experimental group consisted of nineteen male and thirty-one female students enrolled in social dance classes which were taught by the investigator. The control group of fourteen male and twelve female students were enrolled in two archery classes. All classes met for two periods per week, for forty minutes a period, for eight weeks. Data were collected prior to the start of class participation (Test I) and eight weeks afterwards (Test II).

The analysis of covariance was used to conduct the statistical analysis of the data.<sup>1</sup> F-ratio derived from the analysis of covariance indicated that there was a significant difference for females in dynamic balance and leg strength, but no significant difference in agility, trunk flexibility, static balance, and leg power. In three significant variables, the male experimental group made improvement which was

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<sup>1</sup>Jerome C. Weber and David R. Lamb, Statistics and Research in Physical Education (Saint Louis: The C. V. Mosby Company, 1970), p. 146.

significantly better than the changes in the control group. F-ratios derived from the analysis of covariance indicated that there was a significant difference in the male group in dynamic balance, leg power, and leg strength, but no significant difference in agility, trunk flexibility, and static balance. In two significant variables, the female experimental group made improvement which was significantly better than the performance of the control group. F-ratio derived from the analysis of covariance indicated that there was a significant difference in the female group in dynamic balance and leg strength, but no significant difference in static balance, trunk flexibility, agility, and leg power.

### Conclusions

Because of the results of this study and within its limitations, the investigator concludes:

1. Both males and females in the social dance classes made significantly greater improvements in dynamic balance and leg strength than their counterparts in an archery class.
2. Males in the social dance classes derived additional significant benefits over the archery classes in improvement in leg power.

### Implications

Based upon the findings of this study, the following implications are indicated:

1. That there are physiological benefits to participating in social dance classes other than purely social benefits.
2. That values of social dance can be enhanced by stressing not only social values by participants but also that there can be an increase in certain aspects of physical well-being.
3. That dance instructors should be aware of the physiological changes that might occur in participants.
4. That course descriptions of social dance courses which stress only social values be changed to include a statement concerning physiological values.

### Recommendations

Based on the findings of this study, the investigator proposes the following recommendations for further study:

1. That a similar study be completed comparing the selected physiological changes in subjects taking part in square dance, modern dance, folk dance, and social dance.
2. That a study be completed to investigate cardiovascular changes of subjects participating in various types of dance.

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APPENDIX A

REVISED PROPOSAL FOR THE YEAR 1964

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APPENDIXES

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## APPENDIX A

SURVEY SHEET OF ACTIVITIES STUDENTS PARTICIPATE IN  
DURING THE SCHOOL YEAR

Name \_\_\_\_\_ Age \_\_\_\_\_

Male \_\_\_\_\_ Female \_\_\_\_\_

Year in College: Freshman \_\_\_\_\_ Sophomore \_\_\_\_\_ Junior \_\_\_\_\_ Senior \_\_\_\_\_

Check those activities that you participate in during the school year  
and also write in the hours per week you participate in these activities.

			Hours per week
Intramural Basketball	Yes _____	No _____	_____
Football	Yes _____	No _____	_____
Track and Field	Yes _____	No _____	_____
Dance Club	Yes _____	No _____	_____
Baseball	Yes _____	No _____	_____
Gymnastics	Yes _____	No _____	_____

If you have your own exercise program would you please state what you do.

\_\_\_\_\_

\_\_\_\_\_

Please state the hours per week you dance except dance class. \_\_\_\_\_

## APPENDIX B

## TYPES OF SOCIAL DANCES AND VARIATIONS

Bossa Nova

1. Basic Step
2. Cross Step
3. Split the Box
4. Variation of Basic Step

Cha Cha Cha

1. Basic Step
2. Backward Cross Step
3. Criss-Cross Step
4. Crossover
5. Full-Cross Combination
6. Kick Swivel

Charleston

1. Basic Step
2. Double Kick Step
3. Hand Shuttle
4. Kick Step

Foxtrot

1. Basic Step
2. Box Step
3. Conversation Step
4. Dip
5. Forward Magic Step
6. Foxtrot Turns
7. Magic Step

Lindy

1. Basic Step
2. Breakaway Strut
3. Collegiate
4. Double Lindy
5. Single-Turn Break
6. Triple Lindy
7. Tuck Spin
8. Unwrap
9. Walk-Around Break
10. Wrap

## APPENDIX B (Continued)

Polka

1. In a semi-open position, with partner, polka 4 steps LOD, close into closed ballroom position and polka 4 polka turns.
2. Polka Turn

Schottische

1. Basic Step
2. Variation of basic step with 4 step-hops
3. Combinations
  - a. Two schottische steps and 4 step hops forward
  - b. Two schottische steps forward in semi-open ballroom position and 4 step hops backwards
  - c. Two schottische steps forward in semi-open ballroom position and 4 step hops in closed ballroom position making one turn counter-clockwise

Waltz

1. Box Step
2. Conversation Step
3. Forward-Balance Waltz
4. Forward Waltz
5. Hesitation Waltz
6. Side-Balance Waltz
7. Waltz Turns

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1. Harris, Jane A., Anne Pittman, and Marlys S. Waller, Dance A While. Minneapolis: Burgess Publishing Company, 1968.
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3. Kraus, Richard G., and Lola Sadlo. Beginning Social Dance. Belmont: Wadworth Publishing Company, Inc., 1969.
4. Kulbitsky, Olga, and Frank L. Kaltman. Teacher's Dance Handbook. Newark: Bluebird Publishing Company. 1959.

## APPENDIX C

## MONDAY AND WEDNESDAY FAD DANCES AND MUSIC

Alligator

"But It's Alright." J. J. Jackson Tubbs. Warner Bros. Seven Arts  
Records 7276. 33 1/3 rpm.

Boogie-A-Loe

"No Sugar Tonight." American Woman. RCA LSP-4266. 33 1/3 rpm.

Bunny Hop

"Mojo Workout." Paul Revere and the Raiders. Pickwick Records 3176A.  
33 1/3 rpm.

Butterfly or Flying Dutchman

"Gustaf's Skoal." Bean Porridge Hot. Russel Records. Compact 33-726 B.  
45 rpm.

Cowboy

"Next Door to an Angel." Ward Oliver Hit Records. ZTSB-83109. 45 rpm.

Funky Chicken

"I Want to Take You Higher." Sly and the Family Stones. Cotillion-SD  
3-500. 33 1/3 rpm.

Hokey Pokey

"Hokey Pokey." Swing Sextet and the Columbians. Columbia Records for  
Educational Recording of American Inc. ED2 XTV 69822. 33 1/3 rpm.

Monkey

"Skate, Rattle and Roll." Paul Revere and the Raider. Pickwick  
Record-SFC 3176 B. 33 1/3 rpm.

Skate

"Down on the Corner." Creedence Clearwater. Fantasy 8397. 33 1/3 rpm.

Twist

"The Twistin' Fools." Hank Ballard and the Midnighters. King Company  
781. 33 1/3 rpm.

## APPENDIX C (Continued)

## TUESDAY AND THURSDAY FAD DANCES AND MUSIC

Alligator

"But It's Alright." J. J. Jackson-Tubbs. Warner Bros.-Seven Arts  
Records 7276. 33 1/3 rpm.

Bunny Hop

"Mojo Workout." Paul Revere and the Raiders. Pickwick Records 3175 A.  
33 1/3 rpm.

Butterfly or Flying Dutchman

"Gustaf's Skoal." Bean Porridge Hot. Russel Records. Compact  
33-726 B. 45 rpm.

Freddy

"Skate." Jack Hansen and his Orchestra. Dance Along DAL 1319. 33 1/3  
rpm.

Funky Chicken

"I Want to Take you Higher." Sly and the Family Stones. Cotillion  
SD 3-500. 33 1/3 rpm.

Hokey Pokey

"Hokey Pokey." Swing Sextet and the Columbians. Columbia Records for  
Educational Recording of American Inc. ED2 XTV 69822. 33 1/2 rpm.

Minuet

"Back the Sixth Clavier Partias." Bach. PBR-8344. 33 1/3 rpm.

Popcorn

"The Rapper." The Jagers. Kama Sutra KSBS-2017. 33 1/3 rpm.

Skate

"Heard it Through the Grapevine." Cosmos Factory Fantasy 8402.  
33 1/3 rpm.

Twist

"The Twistin' Fools." Hank Ballard and the Midnighters. King  
Company 781. 33 1/3 rpm.

## APPENDIX D

## MUSIC USED IN SOCIAL DANCE CLASSES

Bossa Nova

- "The Girl From Ipanema. Jack Hansen and His Orchestra. Dance Along  
DAL-1320. 33 1/3 rpm.
- "The Sweetest Sounds." Jack Hansen and his Orchestra. Dance Along  
DAL-1320. 33 1/3 rpm.
- "More." Jack Hansen and his Orchestra. Dance Along DAL-1320.  
33 1/3 rpm.

Cha Cha Cha

- "Buends Noches Mi Amor." Jack Hansen and his Orchestra. Dance Along  
DAL-1315. 33 1/3 rpm.
- "Heartaches." Jack Hansen and his Orchestra. Dance Along DAL-1315.  
33 1/3 rpm.
- "Luau Cha Cha Cha." Annette with the Afterbeats. Vista Records F-362y.  
45 rpm.
- "Never On Sunday." Jack Hansen and his Orchestra. Dance Along Dal-1318.  
33 1/3 rpm.
- "Sweet and Gentle." Jack Hansen and his Orchestra. Dance Along  
DAL-1320. 33 1/3 rpm.

Charleston

- "Charleston." Ira Ironstrings (from Charleston in Hi Fi W-1297).  
Flappers, Speakeasies and Bathtub Gin. Warner Bros. Y-1425.  
33 1/3 rpm.
- "Ma (He's Making Eyes at Me)" and "My Honey's Lovin' Arms." Joe "Fingers"  
Carr and Girls of Club 16. Warner Bros. Y-1425. 33 1/3 rpm.



APPENDIX D (Continued)

Foxtrot

- "Angelique." Jack Hansen and his Orchestra. Dance Along DAL-1318.  
33 1/3 rpm.
- "Deep Purple." Arthur Murray. RCA Victor LPM-1909. 33 1/3 rpm.
- "I Left My Heart in San Francisco." Jack Hansen and his Orchestra.  
Dance Along DAL-1315. 33 1/3 rpm.
- "I've Got My Love to Keep Me Warm." Arthur Murray. RCA Victor LPM-  
1909. 33 1/3 rpm.
- "Marine." Jack Hansen and his Orchestra. Dance Along DAL-1318.  
33 1/3 rpm.
- "Red Roses For a Blue Lady." Jack Hansen and his Orchestra. Dance  
Along DAL-1319. 33 1/3 rpm.

Lindy

- "Jersey Bounce." Mike Haley. Hector Records HLP-4005. 33 1/3 rpm.
- "Nice 'n Easy." Jack Hansen and his Orchestra. Dance Along DAL-1315.  
33 1/3 rpm.
- "My Kind of Town." Jack Hansen and his Orchestra. Dance Along DAL-1318.  
33 1/3 rpm.
- "The Second Time Around." Jack Hansen and His Orchestra. Dance Along  
DAL-1320. 33 1/3 rpm.

Polka

- "Domino Polka." Folkrafter. Folkraft Records 1417X45A. 45 rpm.
- "Jessie Polka." Folkraft Americana Orchestra. Folkraft Americana  
Orchestra. Folkraft 1093X45 A. 45 rpm.
- "Hot Clarinet Polka." Lawrence Duchow and his Red Raven Inn Orchestra.  
RCA Victor V-716-A. 78 rpm.

## APPENDIX D (Continued)

Schottische

"Highland Fling." RCA Victor Folk Dance Orchestra. RCA Victor  
45-6179 (EIEB-2996). 45 rpm.

"Highland Schottische." RCA Victor Folk Dance Orchestra. RCA Victor  
45-6170 (EIEB-2996). 45 rpm.

"Horse and Buggy Schottische." Folkraft Records Division. F-1445B  
(78K334). 78 rpm.

"Schottische." Folkraft Records Division. F-1445B (78K334). 78 rpm.

Waltz

"Charade." Jack Hansen and his Orchestra. Dance Along DAL-1320.  
33 1/3 rpm.

"Lollipop's and Roses." Jack Hansen and his Orchestra. Dance Along  
DAL-1315. 33 1/3 rpm.

"Moon River." Those Fantabulous Strings. Metro Records M-551.  
33 1/3 rpm.

"Tennessee Waltz." Jack Hansen and his Orchestra. Dance Along  
DAL-1315. 33 1/3 rpm.

## APPENDIX E

## SUMMARY OF LESSONS TAUGHT IN SOCIAL DANCE

February 8-9

1. New Steps--Foxtrot
  - a) Box Step
  - b) Foxtrot Turns
  - c) Basic Step
  - d) Magic Step

February 10-11

1. Review--Foxtrot
2. New Steps--Foxtrot
  - a) Conversation Step
  - b) Dip
  - c) Forward Magic Step

February 15-16

1. Review--Foxtrot
2. New Steps--Cha Cha Cha
  - a) Basic Step
  - b) Crossover
  - c) Backward Cross Step

February 17-18

1. Review--Foxtrot, Cha Cha Cha
2. New Steps--Cha Cha Cha
  - a) Full-Cross Combinations
  - b) Criss-Cross Step
  - c) Kick Swivel

February 22-23

1. Review--Foxtrot, Cha Cha Cha
2. New Steps--Waltz
  - a) Box Step
  - b) Waltz Turns
  - c) Hesitation Waltz
  - d) Forward Waltz

APPENDIX E (Continued)

February 24-25

1. Review--Cha Cha Cha, Waltz
2. New Steps--Waltz
  - a) Forward-Balance Waltz
  - b) Side-Balance Waltz
  - c) Conversation Step
3. New Steps--Lindy
  - a) Basic Step
  - b) Double Lindy
  - c) Triple Lindy

March 1-2

1. Review--Cha Cha Cha, Waltz, Lindy
2. New Steps--Lindy
  - a) Single-Turn Break
  - b) Walk-Around Break
  - c) Breakaway Strut
  - d) Collegiate

March 3-4

No class because of student walk-out at South Dakota State University because of the Master Plan of Education concerning the removal of the College of Engineering from South Dakota State University.

March 8-9

1. Review--Waltz, Lindy, Foxtrot
2. New Steps--Lindy
  - a) Wrap
  - b) Unwrap
  - c) Tuck Spin
3. New Steps--Polka
  - a) Polka Turn
  - b) In a semi-open position, with partner, polka 4 steps LOD, close into closed ballroom position and polka 4 polka turns.

March 10-11

1. Review--Lindy, Polka, Cha Cha Cha, Foxtrot, Schottische
2. New Steps--Schottische
  - a) Basic Step
  - b) Variation of basic step with 4 step-hops

## APPENDIX E (Continued)

March 15-16

1. Review--Polka, Waltz, Foxtrot, Lindy, Schottische
2. New Steps--Schottische
  - a) Combinations
    - (1) Two schottische steps and 4 step hops forward
    - (2) Two schottische steps forward in semi-open ballroom position and 4 step hops backwards
    - (3) Two schottische steps forward in semi-open ballroom position and 4 step hops in closed ballroom position making one turn counter-clockwise.
    - (4) Balboa--Fad dance of 1940's

March 17-18

1. Review--Schottische, Polka, Lindy
2. New Steps--Charleston
  - a) Basic Step
  - b) Kick Step
  - c) Double Kick Step
  - d) Hand Shuttle

March 22-23

1. Review--Charleston, Schottische, Waltz
2. New Steps--Bossa Nova
  - a) Basic Step
  - b) Variation of Basic Step
  - c) Cross Step
  - d) Split the Box

March 24-25

1. Review--Bossa Nova, Charleston, Schottische
2. New Steps--Fad Dancing
  - a) Funky Shingling
3. The students were divided into groups of 4-8 students and were assigned to present for the other students two fad dances they remember doing and teach other students how to do this fad dance. Students also supplied their own music for their fad dance.

APPENDIX E (Continued)

March 29-30

1. Groups presented by demonstrating and then explaining their fad dance.
2. Dances taught on Monday:
  - a) Bunny Hop
  - b) Skate
  - c) Boog-A-Loo
  - d) Cowboy
  - e) Butterfly
  - f) Monkey
  - g) Alligator
  - h) Hokey Pokey
  - i) Funky Chicken

3. Dances taught on Tuesday:

- a) Bunny Hop
- b) Skate
- c) Minuet
- d) Popcorn
- e) Butterfly
- f) Freddy
- g) Alligator
- h) Hokey Pokey
- i) Funky Chicken

March 31 and April 1

1. Review--Foxtrot, Cha Cha Cha, Waltz, Lindy, Polka, Charleston, Bossa Nova
2. New Steps--Fad Dance
  - a) Twist

## APPENDIX F

INDIVIDUAL MEASUREMENTS OF DYNAMIC BALANCE  
BY BASS STEPPING STONE TEST  
IN TEST I AND II

(Girls' Experimental Group)

Subject	Test I	Test II
1	75.0	88.3
2	88.0	97.1
3	82.8	79.2
4	82.5	86.8
5	86.0	97.4
6	100.6	97.3
7	61.0	85.9
8	61.0	85.0
9	81.5	82.2
10	73.8	82.0
11	76.0	91.3
12	70.2	89.2
13	61.0	85.5
14	85.2	86.5
15	96.1	84.1
16	70.1	88.0
17	93.3	97.5
18	76.7	85.2
19	103.4	103.6
20	85.0	80.0
21	88.0	97.9
22	85.9	101.9
23	97.0	96.8
24	88.5	95.0
25	91.0	83.8
26	82.7	93.3
27	66.0	72.8
28	73.0	93.0
29	78.7	94.7
30	91.6	101.6
31	82.1	81.3
Mean	81.73	89.81

## APPENDIX F (Continued)

(Boys' Experimental Group)

Subject	Test I	Test II
1	79.9	92.3
2	96.8	96.9
3	64.0	73.0
4	88.0	95.0
5	61.6	88.2
6	78.8	93.3
7	97.0	98.0
8	74.5	82.6
9	73.9	90.9
10	78.2	85.3
11	88.5	91.5
12	79.2	72.1
13	94.0	97.4
14	76.4	91.1
15	92.1	94.6
16	97.0	85.1
17	77.7	100.4
18	102.6	103.5
19	91.0	88.0
Mean	83.74	90.48



## APPENDIX F (Continued)

## (Boys' Control Group)

Subject	Test I	Test II
1	91.3	89.8
2	76.0	89.5
3	91.0	91.4
4	73.4	70.1
5	85.7	89.0
6	78.8	78.7
7	88.0	88.6
8	70.8	77.6
9	71.0	75.2
10	76.0	82.1
11	95.8	87.6
12	79.0	85.3
13	91.0	74.3
14	46.2	46.1
Mean	79.57	80.38

## (Girls' Control Group)

1	79.0	77.7
2	90.1	79.2
3	78.8	80.6
4	74.4	82.3
5	88.0	81.7
6	75.0	75.0
7	85.8	79.3
8	82.1	84.0
9	88.0	91.6
10	85.0	86.1
11	86.9	76.3
12	79.3	79.3
Mean	82.70	81.09

## APPENDIX G

INDIVIDUAL MEASUREMENTS IN STATIC BALANCE BY BASS STICK TEST  
 (Crosswise in Test I and II)  
 (inches)

(Girls' Experimental Group)

Subject	Test I	Test II
1	21.6	22.0
2	21.8	33.9
3	21.3	27.1
4	19.6	27.9
5	25.0	24.5
6	26.2	34.8
7	29.1	23.2
8	18.8	19.9
9	27.1	21.5
10	18.2	19.8
11	27.1	23.0
12	22.1	22.2
13	22.6	23.2
14	40.0	34.4
15	29.1	23.7
16	21.0	27.2
17	23.6	33.2
18	20.8	23.3
19	41.7	103.2
20	20.8	19.9
21	38.8	46.4
22	46.2	34.9
23	27.9	45.6
24	24.1	20.7
25	27.3	33.4
26	20.1	24.6
27	20.4	20.6
28	19.7	23.0
29	24.2	16.4
30	26.7	23.8
31	25.2	30.3
Mean	25.75	29.57

APPENDIX G (Continued)

(Boys' Experimental Group)

Subject	Test I	Test II
1	23.8	28.5
2	56.3	25.2
3	20.9	21.9
4	22.5	47.5
5	24.8	27.6
6	15.6	18.2
7	84.0	106.1
8	43.6	44.5
9	24.5	24.7
10	25.4	22.1
11	25.5	28.1
12	21.4	19.0
13	44.2	34.7
14	19.9	24.6
15	25.7	27.0
16	18.2	21.7
17	22.5	21.1
18	25.4	32.0
19	19.5	23.3
Mean	29.67	31.46

APPENDIX G (Continued)

(Boys' Control Group)

Subject	Test I	Test II
1	26.0	21.6
2	22.5	35.2
3	64.4	48.5
4	20.4	20.2
5	40.0	35.5
6	29.3	37.5
7	32.3	37.5
8	21.4	19.6
9	36.6	40.1
10	25.0	25.4
11	32.6	33.9
12	28.5	25.4
13	36.3	28.5
14	21.8	21.4
Mean	31.22	29.59

(Girls' Control Group)

1	20.7	24.1
2	27.7	24.1
3	19.9	19.1
4	24.3	27.1
5	25.7	25.7
6	21.5	20.5
7	45.7	43.1
8	23.2	26.8
9	23.6	29.0
10	23.4	39.7
11	28.2	29.6
12	20.8	21.8
Mean	25.39	27.55

APPENDIX H

INDIVIDUAL MEASUREMENTS IN TRUNK FLEXIBILITY  
 BY MODIFIED SIT AND REACH TEST  
 IN TEST I AND TEST II  
 (inches)

(Girls' Experimental Group)

Subject	Test I	Test II
1	17.00	16.00
2	13.75	18.75
3	17.00	17.50
4	20.00	19.50
5	15.00	14.50
6	18.00	18.75
7	14.00	13.75
8	22.00	22.25
9	21.00	18.75
10	17.00	19.50
11	21.50	21.50
12	20.00	19.00
13	13.75	14.25
14	23.50	23.00
15	17.00	17.50
16	17.00	16.50
17	13.00	12.75
18	18.50	18.75
19	17.00	17.50
20	19.50	21.50
21	22.50	23.75
22	14.50	15.00
23	18.50	17.00
24	20.75	22.00
25	5.00	7.25
26	22.00	22.50
27	16.00	18.50
28	12.50	15.50
29	19.75	20.25
30	16.75	17.25
31	21.00	21.00
Mean	17.57	19.20

## APPENDIX H (Continued)

(Boys' Experimental Group)

Subject	Test I	Test II
1	16.75	16.75
2	18.00	18.00
3	23.00	23.75
4	18.50	19.00
5	17.00	20.50
6	17.50	17.25
7	20.00	19.50
8	16.00	15.75
9	19.50	20.50
10	16.50	20.50
11	19.00	20.50
12	22.00	18.75
13	15.00	17.50
14	18.50	20.00
15	22.25	19.25
16	15.00	13.75
17	19.50	21.75
18	25.00	25.75
19	15.50	15.75
Mean	18.66	19.20

APPENDIX H (Continued)

(Boys' Control Group)

Subject	Test I	Test II
1	19.00	18.50
2	20.00	22.00
3	12.00	11.50
4	12.00	13.75
5	21.00	20.00
6	12.00	13.75
7	19.75	18.25
8	12.50	13.75
9	7.00	7.25
10	20.25	19.25
11	19.50	17.25
12	16.75	16.75
13	13.00	15.50
14	12.00	11.50
Mean	15.48	15.66

(Girls' Control Group)

1	23.00	21.25
2	18.00	18.00
3	18.50	19.00
4	16.50	16.25
5	17.00	18.50
6	20.50	21.50
7	13.00	10.00
8	17.00	15.25
9	20.00	18.25
10	15.50	16.25
11	19.50	19.50
12	10.00	11.50
Mean	17.38	17.10





## APPENDIX J

INDIVIDUAL MEASUREMENTS IN AGILITY  
BY RIGHT BOOMERANG RUN  
IN TEST I AND TEST II  
(seconds)

(Girls' Experimental Group)

Subject	Test I	Test II
1	14.6	14.3
2	14.4	14.1
3	17.5	16.7
4	14.1	14.0
5	17.9	16.3
6	15.2	14.6
7	16.3	16.4
8	14.8	14.9
9	15.9	15.3
10	15.7	14.8
11	16.0	15.3
12	18.6	17.2
13	18.4	16.3
14	18.3	16.6
15	16.9	16.7
16	17.0	16.3
17	16.1	16.1
18	15.1	14.9
19	15.9	15.0
20	16.2	16.0
21	15.9	14.6
22	16.4	15.7
23	16.9	14.9
24	17.4	17.5
25	17.1	14.7
26	17.4	16.1
27	17.5	17.4
28	18.4	16.4
29	15.9	14.6
30	16.4	15.2
31	15.5	14.5
Mean	16.44	15.59

APPENDIX J (Continued)

(Boys' Experimental Group)

Subject	Test I	Test II
1	12.8	13.9
2	14.2	14.0
3	14.1	13.3
4	13.8	13.9
5	14.7	13.7
6	12.8	12.8
7	12.3	13.0
8	13.3	12.7
9	13.5	12.7
10	13.8	13.3
11	13.0	13.1
12	14.3	14.1
13	12.6	12.6
14	15.5	15.1
15	11.3	11.8
16	15.0	14.1
17	12.3	12.2
18	16.1	14.1
19	12.1	11.9
Mean	13.55	13.28

## APPENDIX J (Continued)

## (Boys' Control Group)

Subject	Test I	Test II
1	11.8	12.2
2	14.1	14.0
3	12.0	12.0
4	12.1	12.1
5	13.2	13.1
6	13.6	15.0
7	16.0	14.3
8	14.2	12.6
9	13.9	14.2
10	13.9	13.9
11	13.0	13.0
12	13.6	13.6
13	14.4	14.1
14	15.7	14.7
Mean	13.68	15.53

## (Girls' Control Group)

1	14.1	13.7
2	15.3	15.9
3	15.1	15.7
4	15.5	15.6
5	17.5	15.8
6	15.6	15.2
7	16.4	15.4
8	17.1	17.4
9	15.7	15.7
10	15.6	15.6
11	16.1	14.5
12	15.7	16.0
Mean	15.81	15.54

## APPENDIX K

INDIVIDUAL MEASUREMENT IN LEG POWER  
BY VERTICAL POWER JUMP  
IN TEST I AND TEST II

(Girls' Experimental Group)

Subject	Test I	Test II
1	99.00	126.02
2	110.00	106.38
3	49.58	48.33
4	107.33	113.00
5	52.50	83.92
6	87.50	85.50
7	73.13	75.56
8	129.38	126.04
9	65.00	92.44
10	87.75	95.40
11	88.50	86.63
12	87.83	81.25
13	108.75	109.13
14	97.75	140.00
15	116.42	96.00
16	73.50	73.50
17	105.00	95.00
18	98.33	103.25
19	105.21	107.29
20	83.33	92.44
21	119.17	110.00
22	85.00	81.54
23	93.00	87.13
24	72.04	78.75
25	87.75	105.00
26	69.50	69.00
27	65.00	77.00
28	63.30	72.38
29	106.25	125.25
30	80.75	83.25
31	101.25	106.88
Mean	89.32	94.62

## APPENDIX K (Continued)

(Boys' Experimental Group)

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Subject	Test I	Test II
1	153.83	154.38
2	202.67	198.92
3	165.00	181.48
4	215.83	215.83
5	202.79	186.67
6	166.83	222.75
7	199.13	200.25
8	207.00	207.46
9	181.25	208.00
10	129.75	141.67
11	236.00	223.54
12	140.00	173.44
13	176.00	176.00
14	163.63	174.75
15	151.04	162.00
16	126.67	119.25
17	222.50	216.25
18	189.00	190.75
19	145.83	154.38
Mean	177.62	184.62

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APPENDIX K (Continued)

(Boys' Control Group)

Subject	Test I	Test II
1	153.00	180.83
2	177.33	242.50
3	177.67	180.92
4	228.67	227.50
5	211.08	216.04
6	157.29	145.19
7	166.63	148.50
8	215.88	196.58
9	120.33	140.88
10	186.00	187.88
11	180.92	200.67
12	187.00	198.96
13	148.54	157.50
14	152.38	161.98
Mean	180.69	184.71

(Girls' Control Group)

Subject	Test I	Test II
1	115.58	115.58
2	79.33	70.50
3	84.67	90.67
4	60.00	45.38
5	85.75	86.04
6	95.63	92.67
7	94.60	96.67
8	78.00	93.92
9	104.16	104.16
10	56.67	69.25
11	78.63	69.69
12	85.00	87.75
Mean	84.84	85.19

## APPENDIX L

INDIVIDUAL MEASUREMENT IN LEG STRENGTH BY  
MEDART-DYNAMOMETER IN TEST I AND II  
(pounds pulled)

(Girls' Experimental Group)

Subject	Test I	Test II
1	540	550
2	500	500
3	420	440
4	770	760
5	280	350
6	650	650
7	430	490
8	470	480
9	690	650
10	490	580
11	740	610
12	740	750
13	450	540
14	910	970
15	370	570
16	480	650
17	450	530
18	640	870
19	500	440
20	500	620
21	670	830
22	610	620
23	500	610
24	520	990
25	540	430
26	700	720
27	500	650
28	280	370
29	760	920
30	510	490
31	390	470
Mean	548.39	616.13

APPENDIX L (Continued)

(Boys' Experimental Group)

Subject	Test I	Test II
1	860	1270
2	1130	1140
3	500	640
4	900	1400
5	730	900
6	580	840
7	1090	1210
8	800	1110
9	450	980
10	540	870
11	1050	1150
12	720	770
13	960	1800
14	770	1120
15	575	570
16	670	740
17	1020	1200
18	550	810
19	800	630
Mean	773.42	1007.90



APPENDIX L (Continued)

(Boys' Control Group)

Subject	Test I	Test II
1	810	590
2	1450	1060
3	1050	1050
4	650	620
5	910	800
6	1100	1150
7	810	780
8	850	820
9	650	650
10	1270	1200
11	1110	1110
12	880	820
13	660	720
14	860	570
Mean	932.86	852.14

(Girls' Control Group)

1	540	550
2	590	370
3	490	470
4	260	240
5	650	560
6	540	530
7	470	420
8	520	550
9	750	740
10	610	610
11	450	460
12	340	370
Mean	517.50	489.17

APPENDIX M

SCORE SHEET

TESTS

Test 1

Dance Room Bass Stick Test Time \_\_\_\_\_ Errors \_\_\_\_\_

Test 2

Dance Room Modified Sit and Reach Test  
1st \_\_\_\_\_  
2nd \_\_\_\_\_  
3rd \_\_\_\_\_

Test 3

Dance Room Bass Stick Test (Crosswise)  
Right Foot Left Foot  
1st \_\_\_\_\_ 1st \_\_\_\_\_  
2nd \_\_\_\_\_ 2nd \_\_\_\_\_  
3rd \_\_\_\_\_ 3rd \_\_\_\_\_

Test 4

Gym Right Boomerang Run Score \_\_\_\_\_

Test 5

Gym Vertical Power Jump  
1st \_\_\_\_\_ Weight \_\_\_\_\_  
2nd \_\_\_\_\_  
3rd \_\_\_\_\_

Test 6

Grad Room Medart-Dynamometer  
1st \_\_\_\_\_  
2nd \_\_\_\_\_  
3rd \_\_\_\_\_

MA9-75-1000-89  
PB-5001-37-7AM  
75-531

APPENDIX N

FLOOR DIAGRAM INDICATING PATH TO BE FOLLOWED  
IN BASS STEPPING STONE TEST

