Effects of Aerobics Intervention on Health-related Physical Fitness and Exercise Behavior of the middle-aged and elderly people

Tsui-Er Lee1,*

1 Department of Physical Education, Asia University, Taichung, Taiwan, 413, R.O.C.

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Abstract

This study aims to discuss the effects of a 12-week Aerobics and Exercise Perception course on Health-related Physical Fitness and Exercise Behavior of the middle-aged and elderly people. With purposively sampling, total 38 middle-aged and elderly participants above the age 55 in a community are selected as the research samples for the tests of physical fitness (BMI, 3-min step test, 1-min sit-up, and sit-and-reach) and questionnaire survey of Exercise Behavior before and after the intervention. Descriptive Statistics, Paired-Samples t Test, Independent-Sample t Test, and Chi-Square Distribution Test are utilized for analyses. The research outcomes show that (1) the blood pressure of male and female middle-aged and elderly participants achieves the significant difference (p < .05), (2) the cardiopulmonary, muscular, and flexibility fitness, but not BMI, in Health-related Physical Fitness reaches the significant difference (p < .05), and (3) the effects on Exercise Behavior do not achieve the significant difference (p < .05), but the exercise frequency, period, and item increase apparently; the variables of Exercise could assist in getting well with others, Exercise is funny, and Exercise could release pressure in Exercise Attitude reach the significant difference (p < .05) before and after the intervention; and, Exercise Perception merely achieves the significant difference (p < .05) on Perception of Aerobics. It is concluded that Aerobics and Exercise Perception course could improve Exercise Attitude of the middle-aged and elderly participants and enhance the cardiopulmonary, muscular, and flexibility fitness. For the improvement of body composition, intervention in exercise and diet control suitable for individuals should be planned so as to reduce weight and enhance health.

Keywords: Health-related Physical Fitness, Exercise Behavior, Exercise Attitude, Exercise Perception

Introduction

With the progress of technology and the improvement and popularity of medical care, the expectation of life for human beings is prolonging. According to the survey of Department of Health, Executive Yuan (2011), the national standardized death rate decreased in 2010, the national expectation of life increased for it of males being 76.2 years and females 82.7 years [1]. Because of the prolongation of human life, the physiological, psychological, and social adaption of the elderly is worth concerning. Aging population is a global problem that the threat of chronic degenerative diseases is enhancing with the increasing age. The past research indicated that regular exercise could effectively improve physical and mental health and prevent cardiovascular and chronic diseases form occurrence.

With the awareness of health, National Health and Health Promotion have been emphasized by related researchers. Such Health Promotion focuses on individuals, family, and communities presenting high confidence and willing to be responsible for personal health. The concept and behavior in Health Promotion could be learnt among individuals or the public in communities to change the behavioral model through scientific research. According to the health survey of the middle-aged and elderly people in 1999, gender, educational background, and age were the key factors in the health conditions of the elderly, where the activity functions of the elderly could be reduced because of the educational background [2]. Sung [3] discussed Health Promotion lifestyles and the factors and found that Sports for Healthcare, in the five dimensions of lifestyles, appeared the lowest result. The similar result also showed in Kao’s research [4] on the lifestyle of employees and other studies [5-7]. Accordingly, within the health behaviors measured by the lifestyle scale for Health Promotion, Exercise Behavior revealed the lowest result in various countries.

Physical fitness proposes to promote health with physical activities or exercise. In addition to improve people’s ability to engage in physical activities, physical fitness would further affect the physical health. For this reason, physical fitness activities could be regarded as an exercise treatment, effectively revering or delaying such degradation, enhancing health effectiveness, and achieving the healthcare effect. The
habit of regular exercise to enhance physical fitness and the establishment of healthy lifestyles are the key issues at present. This study therefore tends to improve Health-related Physical Fitness conditions of the public in a community and to establish proper exercise habits and attitudes with the intervention of Health-related Physical Fitness to achieve the purpose of Health Promotion through activity design, implementation, and promotion.

This study aims to discuss
(1) the changes of Health-related Physical Fitness of the middle-aged and elderly participants after Aerobics Intervention, and
(2) the changes of Exercise Behavior, Exercise Attitude, and Exercise Perception of the middle-aged and elderly participants after Aerobics Intervention.

Methods

Research subject

With purposively sampling, healthy participants aged 55-65 in the Health-related Physical Fitness class in a community university are selected as the research subjects. Total 38 participants include females averagely aged 56.35 and males averaged aged 57.67.

Research flow

Within the 12-week research period, pretest and post-test are preceded for the intervention of Health-related Physical Fitness, aiming at enhancing the Health-related Physical Fitness index, Exercise Behavior, and knowledge. With questionnaire survey, the participants are requested for the agreement on the research. Data are collected twice, before and after the intervention.

Research tool

(1) Pretest and post-test questionnaires, the composition of Health-related Physical Fitness, and exercise records are contained in this study. Referring to the questionnaire of Ministry of Education for student physical fitness passport, the items include Exercise Behavior, Exercise Attitude, and Exercise Perception. The tested items for Health-related Physical Fitness contain 1.Body Mass Index (BMI), 2.sit-and-reach (flexibility), 3.1-min bent-knee sit-up (muscular fitness), and 4.3-min step test (aerobic fitness).

(2) Intervention activities

a. Contents of Intervention. To understand the motivation and demands of the members participating in the research, the meaning and importance of Health-related Physical Fitness are explained for the members learning and implementing the Health Promotion knowledge and establishing dynamic lifestyles to be life-oriented. The participants attend the 12-week Health-related Physical Fitness exercise and exercise health cognition course for once a week, with two 60 min sessions each time. The daily Exercise Behavior, requesting the members to follow the exercise in Physical Fitness 333 project (including exercise frequency, times of exercise, exercise strength), is also recorded as the bases of individual Exercise for Health and Exercise Behavior.

b. Course design of Health-related Physical Fitness. The course is divided into physical fitness exercise, including warm-up exercise, major exercise, and stretch exercise, and exercise health cognition. The former lasts for 60 min, with the exercise strength between 65-75%Hrmax. The latter also lasts for 60 min. The course design refers to the relevant literatures [8-9].

Data processing

The collected data are organized and numbered for computer filing. With SPSS 10.0, the statistical analyses are processed, where the significance is set \( \alpha = .05 \).

(1) Descriptive Statistics is applied to describing the physiological index and Health-related Physical Fitness of the middle-aged and elderly participants.

(2) Paired-Samples t Test is utilized for testing the changes of physiological index, Health-related Physical Fitness, and Exercise Behavior before and after the intervention.

(3) Independent-Sample t Test is applied to testing the differences of physiological index, Health-related Physical Fitness, and Exercise Behavior between both genders.

(4) Chi-Square Distribution Test is utilized for the accuracy of Exercise Perception before and after the intervention.

Results

Basic information of research subject

Within the 38 participants, there were 21 females with the average age 56.4 years old, height 158.2cm, weight 59.1kg, systolic blood pressure 126.4 mmHg, and diastolic blood pressure 80.8mmHg and 17 males with the average age 57.7 years old, height 169.6cm, weight 66.7kg, systolic blood pressure 131.7 mmHg, and diastolic blood pressure 81.3mmHg. The blood pressure of both genders was within the normal range.

Effects of Intervention on Health-related Physical Fitness

The effects of Aerobics Intervention on Health-related Physical Fitness of the middle-aged and elderly participants are shown as below.

(1) Health-related Physical Fitness conditions of female middle-aged and elderly participants before and after the intervention. From Table 1, Body Mass Index (BMI) presented 26.7 and 26.7, cardiopulmonary fitness (3-min step test) 61.1 and 67.7, muscular fitness (1-min sit-up) 15.2 and 18.1, and Flexibility (sit-and-reach) 36.0 cm and 41.2 cm before and after the intervention, respectively.

(2) Health-related Physical Fitness conditions of male middle-aged and elderly participants before and after the intervention. From Table 2, Body Mass Index (BMI) appeared 22.9 and 24.9, cardiopulmonary fitness (3-min step test) 55.8 and 61.2, muscular fitness (1-min sit-up) 19.9 and 23.9, and Flexibility (sit-and-reach) 25.7 cm and 30.7 cm before and after the intervention, respectively.

According to the results after the intervention, the
cardiopulmonary, muscular, and flexibility fitness in Health-related Physical Fitness of both genders were enhanced, Body Mass Index (BMI) was not reduced, and the ideal weight index is exceeded.

Table 1. Physiological indices and Health-related Physical Fitness differences of middle-aged and elderly females before and after the intervention.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Before intervention M(SD)</th>
<th>After intervention M(SD)</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (cm)</td>
<td>156.2±3.6</td>
<td>156.4±3.6</td>
<td>-1.79</td>
<td>.088</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>58.1±8.2</td>
<td>57.8±7.9</td>
<td>1.34</td>
<td>.195</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td>126.4±16.0</td>
<td>120.7±14.4</td>
<td>4.30***</td>
<td>.000</td>
</tr>
<tr>
<td>Diastolic blood pressure (mmHg)</td>
<td>80.8±10.9</td>
<td>76.6±9.1</td>
<td>3.38**</td>
<td>.003</td>
</tr>
<tr>
<td>Body Mass Index (BMI)</td>
<td>26.7±4.8</td>
<td>26.7±5.0</td>
<td>-0.61</td>
<td>.952</td>
</tr>
<tr>
<td>3-min step test (sec)</td>
<td>61.1±6.4</td>
<td>67.7±12.0</td>
<td>-3.04**</td>
<td>.006</td>
</tr>
<tr>
<td>1-min sit-up (times)</td>
<td>15.2±7.0</td>
<td>18.1±7.9</td>
<td>-5.46***</td>
<td>.000</td>
</tr>
<tr>
<td>sit-and-reach (cm)</td>
<td>36.0±9.0</td>
<td>41.2±9.6</td>
<td>-5.65***</td>
<td>.000</td>
</tr>
</tbody>
</table>

* p<0.05 , **p< 0.01 , ***p<0.001

Table 2. Physiological indices and Health-related Physical Fitness differences of middle-aged and elderly males before and after the intervention.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Before intervention M(SD)</th>
<th>After intervention M(SD)</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height(cm)</td>
<td>169.6±3.0</td>
<td>169.6±3.0</td>
<td>.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Weight(kg)</td>
<td>66.7±5.5</td>
<td>67.3±4.2</td>
<td>-1.08</td>
<td>.321</td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>131.7±15.8</td>
<td>123.3±17.3</td>
<td>3.67**</td>
<td>.010</td>
</tr>
<tr>
<td>Diastolic blood pressure</td>
<td>81.3±10.2</td>
<td>74.6±9.4</td>
<td>4.41**</td>
<td>.005</td>
</tr>
<tr>
<td>Body Mass Index (BMI)</td>
<td>22.9±2.6</td>
<td>24.9±2.1</td>
<td>-2.73†</td>
<td>.034</td>
</tr>
<tr>
<td>3-min step test (sec)</td>
<td>55.8±8.9</td>
<td>61.2±7.6</td>
<td>-2.65†</td>
<td>.038</td>
</tr>
<tr>
<td>1-min sit-up (times)</td>
<td>19.9±8.1</td>
<td>23.9±8.9</td>
<td>-6.928***</td>
<td>.000</td>
</tr>
<tr>
<td>Sit-and-reach (cm)</td>
<td>25.7±11.3</td>
<td>30.8±10.1</td>
<td>-4.20**</td>
<td>.006</td>
</tr>
</tbody>
</table>

* p<0.05 , **p<0.01 , ***p<0.001

M = Mean ; SD = standard deviation

**Effects of Intervention on Exercise Behavior, Exercise Attitude, and Exercise Perception**

Referring to the questionnaire of Ministry of Education for student physical fitness passports, it was expected to understand Exercise Behavior of the middle-aged and elderly participants in daily life.

1. Exercise Behavior. (a) Knowledge source of exercise presented 50% from friends, family, and classmates, 25% form books and magazines, and 21.4% from broadcast media before the intervention, while 50% from books and magazines and 42.9% form instructors after the intervention. (b) Engaging in exercise at leisure time showed that 75% participants would do so, but 25% would not, and averagely 2.4 days per week and 29.3 min for each time were proceeded before the intervention, while 89.3% participants would do exercise, but 10% would not, and 3.1 days per week and 36.8 min for each time were proceeded after the intervention; and most was moderate exercise. (c) Common exercise contained the most common exercise (top three), walking (taking a walk), hiking, and dancing, for 21 participants before the intervention and the top three exercise, walking (fast walking), dancing, and hiking, for 25 participants after the intervention; besides, the muscular and flexibility exercise were included after the instruction. Accordingly, exercise days, period, and items and participants presented positive growth.

2. Exercise Attitude. In regard to Attitude of the middle-aged and elderly participants before and after the intervention, the variables of Exercise could assist in getting well with others, Exercise is funny, Walking to school and stepping could enhance physical fitness, and Exercise is good for physical and mental health achieved the significant difference before the intervention, while Exercise is funny, Enhancing physical fitness at leisure time, Walking to school and stepping could enhance physical fitness, Exercise could
release pressure. Exercise is good for physical and mental health, and Exercise is all reached the significant difference after the intervention.

(3) Exercise Perception. (a) Perception of exercise days being correctly perceived appeared 24 participants, but 4 wrong, before the intervention, while the correct perception showed 2 participants after the intervention. (b) Perception of exercise period being able to enhance physical fitness was correctly perceived by 14 participants, but 13 wrong, before the intervention, while it was correctly perceived by 8 participants, but 5 wrong, after the intervention; however, 1 participant correctly perceived it before the intervention but did wrongly after the intervention. (c) Perception of weight control being correctly perceived revealed 26 participants, but 2 wrong, before the intervention, while 1 participant improved after the intervention, but 1 still did it wrongly. (d) Perception of Aerobics being correctly perceived presented 11 participants, but 12 did not show such perception. (e) Perception of cardiopulmonary functions and body fat content was 100% perceived before and after the intervention. (f) Perception of joint flexibility being correctly perceived showed 10 participants, while 5 participants still did not correctly perceive it after the intervention, and 3 participants perceived correctly before the intervention but wrongly after the intervention. (g) Perception of free weight (resistance) exercise was correctly perceived by 13 participants, but 5 wrong, while 4 participants turned from correct perception into wrong one.

Discussion

Characteristics of research participants

Regarding the physiological index, both male and female participants do not appear large difference on weight after the intervention, and both systolic blood pressure and diastolic blood pressure achieve the significant difference. Lamarche, Despres, and Pouliot [10] found that regular exercise could reduce the high systolic blood pressure and diastolic blood pressure down to the normal values. Similarly, Mougios, Koudi, Kyparos, and Deligiannis [11] discovered that exercise could reduce blood pressure.

Change and discussion of Aerobics Intervention on Health-related Physical Fitness

After the 12-week intervention, the cardiopulmonary, muscular, and flexibility fitness in Health-related Physical Fitness present the significant difference (P < .05), but the body composition (BMI) does not. Such results show that the intervention of Health-related Physical Fitness could remarkably enhance Health-related Physical Fitness of the middle-aged and elderly participants in the community, similar to the research results of Jette et al [12], Eddy et al [13], Feng & Chen [14], and Li & Feng [15]. The third National Nutrition Survey during 1993-1996 showed that the obesity prevalence appeared higher on the people aged above 45 then the ones above 19 years old [16]. The obesity prevalence in Taiwan is merely a half of it in the USA, but obesity-related diseases and the obesity prevalence of the middle-aged and elderly people are increasing that it is worth emphases and prevention. In this case, the course design for physical fitness could depend on the individuality and the particularity in order to improve the physical fitness, enhance the health, and reduce diseases.

The 12-week physical exercise intervention could effectively improve the Health-related Physical Fitness conditions of the middle-aged and elderly participants. Health-related Physical Fitness course is the major physical activity, and the exercise diary (at least three times a week) is recorded that physical fitness can be promoted and individual exercise habit could be established. With the intervention instruction to teach the public with correct exercise, exercise habits, and knowledge of Exercise for Health, exercise injuries could be reduced.

Change and discussion of Aerobics Intervention on Exercise Behavior, Exercise Attitude, Exercise Perception

Regarding the differences in Exercise Behavior, Exercise Attitude, and Exercise Perception between males and females in the intervention of Exercise Perception course, Exercise Behavior does not appear differences before and after the intervention. However, the results show that exercise population (25 participants), exercise days (3.1 days), exercise period each time (36.8 min), and exercise items are significantly increased after the intervention, and exercise items (muscular and flexibility trainings) related to Health-related Physical Fitness are included. As a result, the Exercise Perception course could benefit the improvement of Exercise Behavior for the middle-aged and elderly people. Kavussanu & Mcauley [17] indicated that people actively engaging in exercise for three times a week was more optimistic than the others engaging in exercise less once a week. In regard to Exercise Attitude, the variables Exercise could assist in getting well with others, Exercise is funny, and Exercise could release pressure present the significant difference before and after the intervention, showing similar results to Chang, Wu & Peng [18], that the 12-week Aerobics could effectively enhance Exercise Attitude and physical fitness of the middle-aged and elderly participants. In terms of Exercise Perception, merely Perception of Aerobics could reveal the significant difference after the intervention, revealing similar results to Chen et al. [19], that activity intervention could largely improve exercise knowledge after the intervention. Apparently, Exercise Perception course during the intervention could improve Exercise Attitude of the middle-aged and elderly participants.

The physical exercise intervention in this study could effectively improve the physical fitness of the middle-aged and elderly participants and help them understand personal Health-related Physical Fitness and Exercise Behavior so as to enhance the exercise habits and to understand the relevance and importance of exercise and health.

It is suggested that proper intervention could offered according to age, ethnic group, environment, and lifestyle, and physical fitness activities could be integrated into community activities. Moreover, the members with over-weight and high body fat should be controlled the weight with diet so as to
reduce the weight and promote the health.

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Reference


AUTHORS BIOGRAPHY

Tsui-Er Lee

Employment: Assistant Professor, Department of Physical Education, Asia University, Taiwan

Degree: Master

Research interests: Exercise physiology

E-mail: vivian@asia.edu.tw