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The Impact of Frequency and Duration of Aerobic Dance on Cardiorespiratory Fitness in Adolescent Girls

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Abstract. This study explored the effect of aerobic dancing frequency and duration on cardiorespiratory fitness in adolescent girls in Makassar. 40 girls, ages 17 to 22, were split into experimental and control groups (n = 20 each) using a quasi-experimental pre-test and post-test control design. Over the course of eight weeks, the experimental group engaged in aerobic dance three times a week for 45–60 minutes, whereas the control group carried on with their regular activities. The 12-minute Cooper Test was used to assess cardiorespiratory fitness. Normality, homogeneity, paired t-tests, and independent t-tests were used in the data analysis. Results demonstrated a substantial VO_2max improvement in the experimental group (Δ mean = +4.70; $p < 0.001$) compared to no significant change in the control group (Δ mean = -0.35; $p > 0.05$). Additionally notable was the post-test difference between the groups ($t = -3.756$; $p < 0.001$). Regular aerobic dance effectively promotes cardiorespiratory fitness in adolescent girls.

Keywords: aerobic dance, exercise frequency, exercise duration, cardiorespiratory fitness.

1 Introduction

Aerobic dance is a sort of rhythmic exercise that activates vast muscle groups continually and has been shown useful in improving heart and lung health. According to the World Health Organization, aerobic physical exercise should be done at least 150–300 minutes per week to receive optimal health benefits. However, a person's level of cardiorespiratory fitness can be affected differently by differences in exercise frequency and duration. (WHO, 2019; Shishira et al., 2024).

Cardiorespiratory fitness is a crucial component of physical fitness, reflecting the ability of the cardiovascular and respiratory systems to support physical activity. This level of fitness is

closely related to the body's capacity to supply oxygen to tissues during moderate to high-intensity physical activity (Flotyńska et al., 2024; Carrard et al., 2022). As a popular form of physical activity, aerobic dance is performed rhythmically and continuously to music, stimulating the cardiovascular, respiratory, and muscular systems simultaneously. More than just physical movement, aerobic dance also provides psychological stimulation through a fun, energetic, and motivating atmosphere. This makes aerobic dance a popular exercise choice for a wide range of people, from teenagers and adults to the elderly (Chavarrias et al., 2021; Arfanda et al., 2025).

When it comes to exercise effectiveness, frequency is a key variable. The American College of Sports Medicine (ACSM) recommends aerobic activity at least three to five times per week for maximum benefit (American College of Sports Medicine, 2020; Arfanda et al., 2022). Regular frequency allows the body to adapt optimally to the training load, thus supporting improved heart and lung function.

Besides frequency, exercise duration also plays a crucial role. Aerobic dance lasting 30–60 minutes per session has been shown to increase cardiorespiratory endurance, burn calories, and improve body composition. Too short a duration tends not to provide sufficient physiological stimulation, while too long a duration can increase the risk of excessive fatigue and even injury. Exercise duration should be tailored to each individual's fitness level and needs (American College of Sports Medicine, 2020; Arfanda et al., 2023).

Physical fitness is greatly enhanced by aerobic dance, especially in terms of cardiorespiratory capacity, muscle strength, flexibility, and balance. VO_2max, a crucial measure of cardiovascular endurance, can be raised by regular aerobic exercise of the right frequency and duration. Aerobic dancing has also been demonstrated to provide psychological advantages, such as lowering stress, elevating mood, and enhancing a person's quality of life. (Yin et al., 2025; Zhang et al., 2025).

This study is innovative in that it uses a control and experimental group design to compare the frequency and duration of aerobic dance on enhancing cardiorespiratory fitness in teenage girls. Most prior research have focused on the effects of aerobic dance in general without isolating the function of frequency and duration of exercise as separate independent factors. Thus, it is crucial to investigate in further detail how aerobic dancing frequency and duration affect physical fitness, particularly in young adults and adolescents who are in their prime working years. In order to enhance the community's quality of life, this study is anticipated to offer both scientific contributions and useful suggestions for creating aerobic dancing programs that are successful, efficient, and relevant.

2 Method

A pre-test and post-test control group design was employed in this quasi-experimental investigation. Teenage girls from Makassar, ages 17 to 22, participated in the study. For eight weeks, the experimental group of twenty teenage girls received aerobic dance therapy three times a week for 45 to 60 minutes per session. Twenty teenage females made up the control group as well; they were not given any particular attention and were merely engaged in their regular activities. The 12-minute Cooper Test was used to test cardiorespiratory fitness and determine VO_2max. An independent t-test was used to compare results across groups and a paired t-test was used to examine differences in pre-test and post-test within groups.

3 Result

To get a baseline overview of the cardiorespiratory fitness of the study participants, VO_2max assessments were performed in both the control and experimental groups before and after treatment. The mean, standard deviation, minimum, and maximum values for each group were then ascertained by descriptive analysis of the collected data. These descriptive data are significant as a basis for analyzing differences in participants' baseline conditions and prospective changes after aerobic dancing intervention with varying frequency and duration. A summary of the results of this descriptive analysis is presented in Table 1.

Table 1. Descriptive Statistics of VO_2max of the Control Group and the Experimental Group

Statistics	Pretest-Control	Post-test Control	Experiment-Pretest	Experiment-Posttest
N	20	20	20	20
Mean	36.8	37.1	37.2	41.8
Standart Deviasi	2.4	2.6	2.5	2.8
Minimum	32.0	32.5	33.0	37.0
Maximum	41.0	41.5	42.0	47.0

Table 1 presents descriptive statistics for VO_2max values in the control and experimental groups, each consisting of 20 participants. In the control group, the mean VO_2max increased slightly from 36.8 at pretest to 37.1 at posttest, with a relatively stable standard deviation (2.4 to 2.6). The minimum value in this group also showed a small increase from 32.0 to 32.5, while the maximum value increased from 41.0 to 41.5. In the experimental group, a more significant increase was observed. The mean VO_2max increased from 37.2 at pretest to 41.8 at posttest, with a standard deviation increasing from 2.5 to 2.8. The minimum value also increased from 33.0 to 37.0, while the maximum value increased from 42.0 to 47.0.

Table 2. Frequency Distribution of VO_2max in the Control Group and Experimental Group

Category	Interval	Pretest-Control	Post-test Control	Experiment-Pretest	Experiment-Posttest
Not enough	< 35	5	4	4	0
Enough	35 – 39	10	11	10	5
Good	40 – 44	4	4	5	9
Very good	≥ 45	1	1	1	6
Total		20	20	20	20

Table 2 displays the frequency distribution of VO_2max values in the control and experimental groups by fitness level category. In the control group, the category distribution did not show significant changes between the pretest and posttest. Participants in the “poor” category

decreased only slightly from 5 to 4, while those in the "sufficient" category increased slightly from 10 to 11. The number of participants in the "good" category remained stable at 4, and those in the "very good" category remained unchanged at 1. The experimental group, however, showed more significant changes in distribution. The number of participants in the "poor" category decreased from 4 in the pretest to 0 in the posttest. In the "sufficient" category, the number of participants decreased from 10 to 5. Conversely, the number of participants in the "good" category increased from 5 to 9, and the number of participants in the "very good" category increased sharply from 1 to 6.

Table 3. Normality Test (Shapiro-Wilk)

Group	N	Sig (p)	Information
Pretest-Control	20	0.248	Normal
Post-test Control	20	0.481	Normal
Experiment-Pretest	20	0.946	Normal
Experiment-Posttest	20	0.279	Normal

Table 3 presents the results of the VO_2max data normality test using the Shapiro-Wilk test in the control and experimental groups, both during the pretest and posttest. The analysis results show that all significance values (p) are greater than 0.05, namely 0.248 for the control-pretest, 0.481 for the control-posttest, 0.946 for the experiment-pretest, and 0.279 for the experiment-posttest.

Table 4. Homogeneity Test (Levene's Test)

Variables	F count	Sig (p-value)	Information
VO2max Pretest	0.123	0.728	Homogeneous
VO2max Posttest	0.175	0.678	Homogeneous

Table 4 displays the results of the homogeneity of variance test using Levene's Test on the VO_2max data of the control and experimental groups. Based on the analysis results, the significance value (p-value) for the pretest VO_2max was 0.728 and for the posttest VO_2max was 0.678, both greater than 0.05.

Table 5. Results of Multiple Linear Regression Analysis

R	**R2**	**Adjusted R^2**	**Std Error**	**F count**	**Sig (p)**
0.742	0.550	0.528	2,456	15,231	0.000

According to Table 5, the multiple linear regression analysis's correlation coefficient (R) value is 0.742, indicating a good link between aerobic dancing (the dependent variable) and the frequency and duration of exercise (the independent variables). The coefficient of determination (R^2) value of 0.550 suggests that about 55.0% of the variation in the implementation of aerobic dancing can be explained by the frequency and duration of exercise. Meanwhile, the Adjusted

R^2 value of 0.528 suggests that after adjusting for the number of predictor variables, the model is still able to explain 52.8% of the variation in aerobic dance. Furthermore, the regression model's relevance is confirmed by the computed F value of 15.231 with a significance of 0.000 ($p < 0.05$), indicating that the frequency and duration of exercise have a substantial impact on teenage girls' use of aerobic dancing.

Table 6. Paired Sample t-Test

Group	N	Mean-Pretest	Mean-Posttest	Delta Mean	Delta SD	t	df	p-value	Information
Control	20	37.50	-0.35	1.50	1.50	1,046	19	0.309	Not Significant
Experiment	20	42.45	+4.70	2.36	2.36	-8,891	19	0.000000034	Significant

Table 6 indicates that the findings of the paired t-test show that in the control group with 20 individuals, the average pretest score was 37.50, while the posttest witnessed a little reduction with a mean difference (delta mean) of -0.35. The standard deviation of change (delta SD) was recorded at 1.50, with a t-value of 1.046, degrees of freedom (df = 19), and a significant value of $p = 0.309$ (> 0.05). This suggests that the control group's pretest and posttest results did not significantly differ from one another. In contrast, the average pretest score in the experimental group with the same number of patients (20) was 42.45, and the average posttest score rose with a delta mean of +4.70. The standard deviation of change (delta SD) value is 2.36, with t = -8.891, df = 19, and a significance value of $p = 0.000000034$ (< 0.05).

Table 7. Independent Sample t-Test

Group	N	Mean Post Control	Mean Experiment Post	T	df	p-value	Information
Control vs Experiment	20	37.50	42.45	−3,756	38	0.000578	Significant

Table 7 shows the results of the independent t-test, indicating a significant difference between the control and experimental groups in the post-test results. The control group with 20 subjects had a post-test average of 37.50, while the experimental group with the same number of subjects (20 people) had a higher post-test average of 42.45. The t-value of −3.756, with degrees of freedom (df = 38), produced a significance value of $p = 0.000578$, which is much smaller than the significance level of 0.05, and even smaller than 0.001.

4 Discussion

The results of this study indicate that the frequency and duration of aerobic dance significantly influence the cardiorespiratory fitness of adolescent girls. This finding is consistent with the recommendations of the World Health Organization and the American College of Sports Medicine (ACSM), which recommend aerobic physical activity be performed at least three to five times per week for 30–60 minutes per session (WHO, 2019; American College of Sports Medicine, 2020; Crowley et al., 2022). The experimental group given intervention according to

these guidelines showed a significant increase in VO_2max, while the control group experienced no significant change.

The experimental group's increased VO2max can be physiologically explained by changes in the respiratory and cardiovascular systems brought on by regular aerobic dancing. Continuous, rhythmic aerobic exercise can boost lung capacity, enhance the heart's capability to pump blood, and enhance the effectiveness of oxygen delivery to tissues (Mandić et al., 2022; Deliceoğlu et al., 2024; do Nascimento et al., 2023). An average increase in VO2max of 4.70 ml/kg/min indicates that this adaptation promotes an increase in cardiorespiratory capacity.

The results of this study support earlier research showing that frequent aerobic dance at moderate to high intensities can enhance physical fitness and lower the risk of cardiovascular disease. Enhanced cardiorespiratory capacity is strongly associated with endurance and quality of life (Yue et al., 2025:Tucker et al., 2022; Johansen et al., 2025). In addition to offering factual proof of aerobic dance's efficacy, the study's findings corroborate current hypotheses about the benefits of physical activity for health.

The noteworthy distinction in outcomes between the experimental and control groups further implies that improving cardiorespiratory fitness requires regular routine activity in addition to focused aerobic training. This highlights how crucial it is to follow a planned exercise regimen with the right frequency and length. The body does not develop enough physiological changes to raise VO2max capacity in the absence of a regular training stimulus (Maginador et al., 2020; Zang et al., 2022; Zhou et al., 2025).

Practically speaking, this study suggests that adolescent females and the general public can get the most out of aerobic dance by doing it at least three times a week for 45 to 60 minutes each time. In addition to increasing cardiorespiratory endurance, this exercise regimen is practical and useful for day-to-day living. Overall, the study's findings support the idea that controlling the frequency and length of aerobic dance is essential for enhancing physical fitness. Exercise regimens that are inconsistent or too short will not yield meaningful results. Therefore, the main elements of creating a successful aerobic dancing program are consistency, suitable frequency, and adequate duration.

5 Conclusion

This study found that adolescent girls' cardiorespiratory fitness was considerably enhanced by the frequency and duration of aerobic dance. VO_2max significantly increased in the experimental group, which worked out three times a week for 45 to 60 minutes per session for eight weeks, while there were no significant improvements in the control group. Thus, adolescent females and other productive age groups may benefit from regular aerobic exercise in accordance with recommendations to improve cardiorespiratory endurance.

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