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COMPARATIVE EFFECTS OF AEROBIC DANCE AND JOGGING ON THE RESTING HEART RATE AND BODY MASS INDEX OF JUNIOR SECONDARY SCHOOL TEACHERS

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Abstract
This study examined the effects of aerobic dance and jogging on the resting heart rate and body mass index of junior secondary school teachers in Ogba-Egbema-Ndoni Local Government Area (ONELGA). The study adopted an experimental design with a sample size of thirty (30) teachers, who were randomly selected from six junior secondary schools in ONELGA. The participants were randomly allocated into three groups, each consisting of ten (10) teachers: the control group and two experimental groups. They were also subjected to a 30-minute session of aerobic dance and jogging, and their physiological characteristics were evaluated. The finding was that the resting heart rate recorded a mean difference of 7.35, 7, and 10.9, while the mean gains were 3.55 and 3.9, respectively. The body mass index recorded the mean difference as 1.13, 0.962, and 0.54, while the mean gain was 0.59 and 0.422, respectively. This implies that aerobic dance and jogging affect the resting heart rate and body mass index of junior secondary school teachers in ONELGA. Therefore, it is recommended that junior secondary school teachers in ONELGA incorporate aerobic dance and jogging into their daily routine as a means to enhance the functioning of their RHR and BMI.

Keywords: Aerobic dance, Jogging, Resting heart rate, Body mass index

Introduction

The measurable features of the teachers that characterize the operations and processes that occur within the body are referred to as physiological parameters. These metrics provide significant information about humans' health and well-being, as well as aiding in understanding the mechanisms driving normal biological processes and disease. Heart rate, blood pressure, body temperature, oxygen saturation, respiratory rate, muscle strength, metabolic rate, and hormone levels are components of physiological parameters. These physiological parameters are frequently used in clinical settings to examine and diagnose a variety of medical disorders. Physiological metrics are essential for understanding normal bodily functions, diagnosing disease, and assessing the efficiency of therapies. The desire to have a strong and healthy body has led some individuals to engage in physical exercise (Afriani et al., 2021; Okocha et al., 2023).

Exercise is a form of physical activity that enhances or sustains physical fitness as well as overall health and well-being. Engaging in physical exercise confers numerous advantages to individuals with a keen interest in the activity. These benefits encompass facilitating physical development and enhancing strength, fostering muscular growth and cardiovascular fitness, refining athletic abilities, promoting weight reduction or management, ameliorating overall health, and providing recreational enjoyment (Szuhany et al., 2015). The categorization of physical activities is based on their impact on the human body, resulting in two distinct types: aerobic exercise and anaerobic exercise (Husak et al., 2015). Aerobic exercise refers to physical activity that is performed in the presence of oxygen. Examples of aerobic exercise include aerobic dance, jogging, walking, running, swimming, and similar activities. Anaerobic exercises refer to physical activities performed without the presence of oxygen, beyond the intensity of moderate to strenuous exertion. Examples of such workouts encompass sprinting distances of 100 metres or 50 metres, as well as engaging in boxing, wrestling, and similar activities.

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Anaerobic activity is the term used to describe physical activity that falls within the range of moderate-to-intense intensity. Regular physical activity is crucial for the preservation of physical fitness and can contribute to the maintenance of a desirable body weight, regulation of the digestive system, development and sustenance of optimal bone density, muscle strength, and joint mobility. Additionally, engaging in physical exercise promotes overall physiological well-being, mitigates the risks associated with surgical procedures, and fortifies the immune system. Numerous academic researchers have discovered that engaging in regular physical exercise is associated with a significant enhancement in both life expectancy and general quality of life. According to Husak et al. (2015), there is a significant association between engaging in moderate-to-vigorous physical activity and a reduced mortality risk in comparison to individuals who do not participate in regular physical activity. According to Kaewwong and Sota (2020), there exists a positive relationship between exercise and both happiness and health. Chu et al. (2015) suggested that engaging in regular exercise confers protective benefits against various major diseases, including but not limited to obesity and mental illness. Engaging in regular and uninterrupted physical activities, such as dancing, jogging, running, cycling, and swimming, yields a multitude of cognitive advantages and impacts the brain. These include heightened levels of neurotransmitters, enhanced delivery of oxygen and nutrients, and improved memory function. Engaging in physical activity is beneficial in weight management, disease prevention, bone and muscle strengthening, as well as enhancing the capacity to carry out everyday activities (Sharma et al., 2017). Engaging in moderate-to-vigorous physical activity and reducing sedentary behaviour can have positive effects on the health of adults. Physical activity has been found to have positive effects on the health of individuals across all demographics, including but not limited to age, ability, ethnicity, shape, and size (Smith, 2019). Aerobic exercise refers to a form of physical activity or a sequence of physical activities that incorporates rhythmic aerobic movements alongside stretching and strength training exercises, to enhance many dimensions of physical fitness, including flexibility, muscular strength, and cardiovascular endurance. Aerobic training encompasses a wide range of activities aimed at enhancing both physical and respiratory capabilities. The routine comprises several workouts such as jogging in place, knee-ups, quick kicks, running, marching, and other similar activities. This has a positive effect on the circulatory system, body composition, and certain fitness factors (Dustman et al., 2014; Blumenthal et al., 2021). Aerobic exercises are commonly associated with low-speed endurance activities such as jogging and aerobic dance (Edelstein, 2021). Aerobic exercise also impacts the lungs, heart, and cardiovascular system since it increases the inhaling capacity of the lungs as well as the percentage of total blood.

Dance is a performative artistic discipline characterized by the execution of either spontaneous or premeditated sequences of bodily movements, which include qualities of visual appeal and frequently convey symbolic meanings. Dance can be categorized and delineated according to its choreographic structure, repertoire of movements, historical epoch, or geographical provenance (Foster, 2011). Dance requires both cognitive focus and physical strength (Foster, 2011). It is regarded as an aesthetically pleasing art form because of its ability to create a completely self-contained world for dancers in which they are capable of physical effort, prowess, and endurance far beyond their normal abilities (Phillips, 2015). Individuals can creatively manifest their self-expression through movement within this challenging and dynamic art form. This art form enables individuals to modify their movements by rhythmic patterns and fluid motions, thereby captivating an audience both on stage and in film. According to Alpert (2010), dance is a good option for a physically and emotionally satisfying alternative workout regimen because it has historical roots in ancient Greek and Egyptian civilizations. Dance, like other activities that require physical exertion, requires the development of both psychological and physiological abilities. According to Alpert (2010), dance offers a viable option for individuals who have a distaste for conventional forms of physical activity due to its pleasurable and communal nature. Physical activity has been found to provide numerous benefits, including calorie expenditure, muscle strengthening, enhanced balance, increased flexibility, improved cardiovascular health, and cognitive growth (Phillips, 2015). Aerobic dance exercise refers to any form of physical activity that induces perspiration, increases respiration rate, and elevates heart rate beyond its baseline level. Aerobic dance exercises have been found to enhance cardiovascular endurance by promoting the strengthening of the heart and lungs, as well as improving the efficiency and speed at which oxygen is transported and supplied to various bodily tissues. Aerobic dance involves the activation of multiple muscle groups, exhibits a rhythmic pattern, and may be sustained for a minimum duration of 10 minutes without interruption. Aerobic dance refers to a form of physical exercise conducted inside a collective exercise environment. Every individual engages in aerobic dance for personal motivations, including enhancing their physical well-being, achieving weight loss goals, strengthening their muscles, and enhancing their overall quality of life. Aerobic dance is founded on movements that draw inspiration from various dance forms. A group exercise situation, is a cardiovascular workout set to music. Because the

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instructors demonstrate the choreography both verbally and physically during the classes, you don't need to remember any dance moves. When you use full-body, rhythmic, large-muscle exercises, the classes are termed aerobic.

Jogging is a type of exercise that entails running slowly for an extended period. It is regarded as one of the most effective forms of aerobic exercise and is extremely beneficial to overall health. The essence of jogging is geared towards increasing endurance, and it is frequently used to build endurance in preparation for other types of sporting activities. Jogging also helps to prevent muscle and bone damage that occurs with age, improves heart performance and blood circulation, and aids in the maintenance of a healthy weight (Pedisic et al., 2020). Paffenbarger et al. (2013) found that adolescent females with depressive symptoms may benefit from jogging to improve their depressive state, hormonal response to stress, and physical fitness. Jogging is a form of locomotion characterized by a slow or leisurely trotting or running gait. The principal objective of jogging is to enhance physical fitness by exerting a lesser degree of pressure on the body compared to running at higher speeds, yet a greater degree of strain than walking. Additionally, jogging allows individuals to sustain a consistent pace over extended durations. This refers to a form of cardiovascular exercise that focuses on building endurance through sustained physical activity over extended distances. Engaging in regular jogging has been found to have a significant impact on weight reduction, particularly when accompanied by dietary modifications. According to Katch et al. (2022), engaging in jogging has been found to have positive effects on cardiovascular health and immune system functioning. Additionally, it has been associated with reduced insulin resistance and improved management of stress and depression. Furthermore, regular jogging has been shown to contribute to maintaining flexibility in elderly individuals. While engaging in sporting activities, individuals experience several physiological changes in their bodies, including heightened muscular activation, an increased respiration rate, an elevated heart rate, perspiration, and alterations in body temperature. The physiological indicators discussed in this study exhibit a strong correlation with both the intensity and duration of physical activity (Dalene et al., 2018). Therefore, the researcher must examine the comparative impact of aerobic dance and running on the resting heart rate (RHR) and body mass index (BMI) of junior secondary school teachers in ONELGA, Rivers State.

Statement of the Problem

The health status of teachers in ONELGA can be attributed to factors such as mental health, a lack of physical activity and distress. Engaging in regular physical activity has been shown to have positive effects on brain health, weight management, disease prevention, musculoskeletal strength, and functional capacity for daily activities. Educators who adopt a sedentary lifestyle to a lesser extent and actively participate in moderate-to-vigorous physical activities see positive effects on their overall well-being.

The decrease in physical activity has been linked to a lack of engagement in physical pursuits during free time, as well as prolonged periods of sedentary behaviour in occupational and domestic settings. Likewise, the escalated utilization of "passive" forms of transportation is associated with a dearth of physical exercise. This is based on the convenience that new technological advancements offer. Teachers' lifestyles are constantly changing, which leads to a decrease in activities expressed through physical activity. Teachers were once known for being physically fit and living long lives, based on the fact that they walked to and from school, and at school, they participated in physical activities with the students, which made them healthier and smarter. Despite widespread recognition of the health benefits of physical activity (PA), inactivity and prolonged sitting continue to be common among teachers in recent times against the popular belief of being physically active.

Aim and Objectives of the study

This study aimed to compare the effects of aerobic dance and jogging on the RHR and BMI of junior secondary school teachers in ONELGA.

The research specifically considered the following objectives:

1. To determine the difference in the effect of aerobic dance and jogging on the resting heart rate (RHR) of junior secondary school teachers in ONELGA
2. To determine the difference in the effect of aerobic dance and jogging on the body mass index (BMI) of junior secondary school teachers in ONELGA.

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Research Question

The following research questions guided the study:

1. What is the difference in the effect of aerobic dance and jogging on the resting heart rate (RHR) of junior secondary school teachers in ONELGA?
2. What is the difference in the effect of aerobic dance and jogging on the body mass index (BMI) of junior secondary school teachers in ONELGA?

Hypotheses

The following hypotheses were formulated and tested in the study:

1. There is no significant difference in the effect of aerobic dance and jogging on the resting heart rate (RHR) of junior secondary school teachers in ONELGA.
2. There is no significant difference in the effect of aerobic dance and jogging on the body mass index (BMI) of junior secondary school teachers in ONELGA.

Methodology

Ogba-Egbema-Ndoni Local Government Area (ONELGA) represents a local government area situated in Rivers State, Nigeria, with its administrative centre located in Omoku. Based on the data from the 2006 Census, the geographical boundaries of the area in question are demarcated by the Imo, Delta, and Bayelsa states, as well as the Ahoada West, Ahoada East, and Emohua Local Government Areas of Rivers State. The aforementioned regions are situated inside the Igboid-speaking territories of Rivers State. These areas consist of three distinct tribes, namely the Ogba tribe, which has a position of dominance and encompasses 12 legislative wards. Additionally, the Egbema and Ndoni tribes are there, each with 2 and 3 legislative wards, respectively. The region is predominantly characterised by elevated terrain and has served as the primary location for upstream oil and gas exploration and exploitation in the state since the early 1960s. It encompasses approximately 12 mining and producing fields that are operated by AGIP, Total Energies, Shell, and NPDC, in addition to numerous more reserves and untapped fields. The aforementioned constituencies, namely Ogba, Egbema, Ndoni, and Ahoada West are integral components of the Nigerian House of Representatives. The Executive Chairman of ONELGA is Hon. Vincent Job. The research was carried out at the Sports Field and Exercise Physiology Laboratory of the Federal College of Education (Technical), Omoku.

An experimental design was adopted for this study. A preliminary assessment was carried out to measure the resting heart rate, systolic and diastolic blood pressure, percent body fat, body mass index, and cardiovascular endurance of the three groups involved in the study, which consisted of two experimental groups and one control group. The experimental groups subsequently engaged in a six-week aerobic dance and running exercise, while the control group was instructed to maintain their regular daily activities. The aerobic dance and jogging plan was conducted three times per week, with each session lasting a total of 30 minutes. The plan commenced with a period of low-intensity aerobic dance and jogging lasting one week. Subsequently, it transited to a phase of moderate-intensity aerobics dance and jogging spanning two weeks. Finally, it progressed to a stage of high-intensity aerobics dance and jogging for three weeks, encompassing warm-up and cool-down exercises. A post-test was administered to the three groups following six weeks.

The survey encompasses the entire population of junior secondary school teachers in ONELGA, Rivers State. A sample of 30 junior secondary school teachers was drawn from six schools located in ONELGA, Rivers State. A total of 30 participants were selected, consisting of five teachers from each of the following schools: Government Secondary School Obite, Government Secondary School Kerigani, Community Girls Secondary School Omoku, Community Secondary School Amah, Egbema Grammar School Okwuzi, and Government Secondary School Ndoni. The following instruments were used in this study: a Lange skinfold calliper, a weighing scale, a stopwatch, a sphygmomanometer, and a stethoscope.

The researchers employed simple random sampling techniques to choose 6 schools in Onelga, Rivers State, in which 30 junior secondary school teachers volunteered to participant in the study. They were randomly assigned to two experimental and one control groups using a simple ballot method. The initial cohort of 10 instructors was assigned to the control group, while the subsequent two cohorts of 10 teachers were designated as experimental groups one

and two, respectively. The experimental group one consists of eight (8) female and two (2) male teachers who engage in aerobic dance. The experimental group 2 comprises four (4) female and six (6) male teachers who participate in jogging. Lastly, the control group is composed of seven (7) female and three (3) male teachers.

The following procedures were adopted:

1. The training programme consisted of aerobic dance and jogging.
2. The training programme comprises three sessions of aerobic dancing and jogging, scheduled three times per week, specifically on Monday, Wednesday, and Friday.
3. Each participant underwent training by completing a range of 10 to 20 repetitions of thirty-minute work intervals. After each work interval, the individual engages in five minutes of rest. During this designated time frame, the researcher and her team conducted pulse measurements twice. These measurements were taken at two distinct moments, specifically:
4. a. The first measurement was conducted five seconds after the work interval, and the pulse was counted for six seconds.

   b. After the completion of the work interval, the pulse should be counted for six seconds, commencing twenty seconds thereafter. The products were multiplied by a factor of five to determine the value of beats per minute. The time for training was between 7.30 and 9.30 a.m. each day.
5. Each training session consisted of three segments. One of the recommended warm-up exercises is a general body warm-up, which typically lasts for 5 minutes. The exercise routine consists of a 10-minute duration phase that includes aerobic dance and jogging. Engage in a period of relaxation and reduced activity. The duration of the activity is 15 minutes.
6. The training sessions and measurements were conducted at the sports fields of the Federal College of Education (Technical), Omoku. The test treatment and measurements were administered by the researcher with the assistance of four research assistants.

The data analysis involved the use of both descriptive and inferential statistical tools. The variables were subjected to computation to determine their means and standard deviations. The present study employed the analysis of covariance (ANCOVA) to test the hypotheses, with a significance threshold of 0.05, regarding the discernible disparities in the impact of aerobic dance and jogging on the physiological parameters of junior secondary school teachers in ONELGA.

Results

Resting Heart Rate (RHR) of Junior Secondary School Teachers in ONELGA

The data generated about research question one was subjected to analysis using the mean to determine the difference in resting heart rate between both groups. Standard deviation was also used to determine the variation in resting heart rate before and after. The results obtained are shown in Table 1

Table 1: resting heart rate analysis of junior secondary school teachers.

GROUP		Pre-test		Post-test		Mean		
	N	M ean	SD	Mean	SD	Diff	Gain	Decision
Aerobic Dance (Exp. Group 1)	10	82.48	3.74	75.13	1.80	7.35	3.55	Positive
Jogging (Exp. Group 2)	10	81.43	3.61	74.43	1.75	7	3.9	Positive
Control Group	10	90.8	5.04	101.7	8.23	10.9		

The mean of the aerobic dance pre-test and post-test was 82.48 and 75.13 with a standard deviation of 3.74 and 1.80, and the mean of the jogging pre-test and post-test was 81.43 and 74.43 with a standard deviation of 3.61 and 1.75. The mean of the control pre-test and post-test was 90.8 and 101.7 with a standard deviation of 5.04 and 8.23. The mean of the control group is greater than the mean of the experimental groups. The mean difference is 7.35; 7; and 10.9, while the mean gain is 3.55 and 3.9, respectively. This implies that aerobic dance and jogging affect the resting heart rate of junior secondary school teachers in ONELGA. The data generated concerning hypothesis one was

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subjected to analysis of covariance (ANCOVA) for aerobic dance and jogging. The results are represented in Table 2.

Table 2: ANCOVA analysis on the RHR of junior secondary school teachers

Source	Type 111 Sum of Squares	Df	Mean square	F	Sig	Decision
Corrected Model	5100.65[a]	3	1700.218	110.065	.000	
Intercept	290.974	1	290.974	18.836	.000	Sig.
Covariate	267.451	1	267.451	17.314	.000	
Group	2355.826	2	1177.913	76.253	.000	
Error	401.633	26	15.447			
Total	215945.938	30				
Corrected Total	5502.287	29				

Significant at sig of F <.05

The ANCOVA result in Table 2 showed that the calculated significant probability value at the group (0.000) is less than 05, which showed that there is a significant difference between the mean scores of the experimental groups and the control. Thus, the null hypothesis that there is no significant difference in the effect of aerobic dance and jogging on the resting heart rate (RHR) of junior secondary school teachers in ONELGA is rejected.

Body mass index (BMI) of junior secondary school teachers in ONELGA

The data generated about research question two was subjected to analysis using the mean to determine the difference in body mass index between both groups. Standard deviation was also used to determine the variation in body mass index before and after. The results obtained are shown in Table 3

Table: 3 Body mass index analysis of junior secondary school teachers.

GROUP		Pre-test		Post-test		Mean		
	N	Mean	SD	Mean	SD	Diff.	Gain	Decision
Aerobic Dance (Exp. Group 1)	10	22.19	1.41	21.06	1.21	1.13	0.59	Positive
Jogging (Exp. Group 2)	10	22.002	1.29	21.04	1.13	0.962	0.422	Positive
Control Group	10	26.65	1.97	27.19	2.19	0.54		

The mean of the aerobic dance pre-test and post-test was 22.19 and 21.06 with a standard deviation of 1.41 and 1.21, and the mean of the jogging pre-test and post-test was 22.002 and 21.04 with a standard deviation of 2.19 and 1.65. The mean of the control pre-test and post-test were 26.65 and 27.19, respectively, with a standard deviation of 1.97 and 2.19. The mean of the control group is greater than the mean of the experimental groups. The mean difference is 1.13, 0.962, and 0.54, while the mean gain is 0.59 and 0.422, respectively. This implies that aerobic dance and jogging affect the body mass index of junior secondary school teachers in ONELGA. The data generated concerning hypothesis two was subjected to analysis of covariance (ANCOVA) for aerobic dance and jogging. The results are represented in Table 4

Table 4: ANCOVA analysis on BMI of junior secondary school teachers.

Source	Type 111 Sum of Squares	Df	Mean square	F	Sig	Decision
Corrected Model	278.415[a]	3	92.805	101.552	.000	
Intercept	1.232	1	1.232	1.348	.041	Sig.
Covariate	55.561	1	55.561	60.798	.000	
Group	7.579	2	3.789	4.146	.027	
Error	23.761	26	914			
Total	17496.362	30				
Corrected Total	302.175	29				

Significant at sig of F <.05

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The ANCOVA result in Table 4 showed that the calculated significant probability value at the group (0.027) is less than 05, which showed that there is a significant difference between the mean scores of the experimental groups and the control. Thus, the null hypothesis that there is no significant difference in the effect of aerobic dance and jogging on the body mass index (BMI) of junior secondary school teachers in ONELGA is rejected.

Discussion

Resting heart rate and junior secondary school teachers

The findings from the data analysis indicated that junior secondary school teachers in ONELGA who participated in aerobic dancing and jogging exhibited a lower average score of 75.13 and 74.43, respectively, compared to the control group, which demonstrated a higher mean score of 101.7. This suggested that there is a favourable impact of aerobic dance and jogging on the resting heart rate of junior secondary school teachers in ONELGA. The obtained outcome aligns with the conclusions drawn by Armstrong et al. (2022), whose study investigated the impact of exercise on resting heart rate and observed a decrease in resting heart rate. In a related study, Albert Perez al. (2019) documented a decrease in resting heart rate as a result of engaging in both mild and rigorous warm-up exercises, and examined the impact of these exercises on the cardiac response during intense physical activity. The results of Shannan's (2020) and Tyson and Elizabeth-Sockett's (2016) studies were consistent with the aforementioned findings since they provided evidence that aerobic training and resistance exercise exert a notable impact on resting heart rate.

Body mass index and junior secondary school teachers

The findings from the data analysis indicate that junior secondary school teachers in ONELGA who participated in aerobic dance and jogging exhibited a lower mean body mass index (BMI) of 21.06 and 21.04, compared to the control group which had a higher mean BMI of 27.19. These results suggest that the impact of aerobic dance and jogging on the BMI of junior secondary school teachers in ONELGA is statistically significant. The findings presented align with the findings of Gibson (2018)., whose study investigated the correlation between body mass index and body composition, physical activity, and food preferences among university students. Gibson's research revealed a decrease in body mass index. In a related study, John et al. (2022) observed a reduction in body mass index as a result of engaging in physical exercise on a treadmill. The results obtained by Awi et al. (2021), Gonsi and Mong (2022), and Gunel et al. (2020) are consistent with the aforementioned findings since they provide evidence supporting the notion that a 12-week regimen of step aerobic exercise yields a statistically significant improvement in body mass index.

Conclusion

This study examined and compared the effects of aerobic dance and jogging on the resting heart rate (RHR) and body mass index (BMI) of junior secondary school teachers in ONELGA. The results of the study indicated that engagement in aerobic dance and jogging had a significant influence on the resting heart rate and body mass index of junior secondary school teachers in ONELGA. This premise is predicated upon the observation of a diverse array of disparities between the control group and the experimental group consisting of junior secondary school teachers in ONELGA.

Recommendations

In light of the research findings, the subsequent recommendations are put out.

1. Junior secondary school teachers in ONELGA should regularly participate in aerobic dance and jogging activities to enjoy a healthy resting heart rate.
2. Junior secondary school teachers in ONELGA should regularly participate in aerobic dance and jogging activities to reduce their body mass index.

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