Nigerian Journal of Health Promotion
ISSN: 0995-3895
Vol 18, No1, 2025
HEPRAN

Gender Disparities in the Impact of Moderate-Intensity Interval Training and Continuous Training on Fitness Levels and Body Mass Index in Bayelsa State

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Abstract

The study investigated gender disparities in the impact of moderate-intensity interval and continuous training on Fitness Level and Body Mass Index (BMI) of Sports Club Members in tertiary institutions in Bayelsa State. The study was guided by two objectives, two research questions, and two hypotheses. A randomized pretest-posttest control group design was employed, with pretests administered to both control and experimental groups to measure BMI. The experimental groups underwent 12 weeks of moderate intensity interval and continuous training, followed by a posttest for all groups. The population of the study comprised all 987 registered sports club members in Niger Delta University. One hundred and twenty Sports Club Members in tertiary institutions in Bayelsa State (59 males and 61 females) were randomly assigned to the experimental and control groups using the fish bowl method. Data collection instruments included a Stadiometer (SECA 217) and an Omron Karda Scan Body Composition Monitor (HBF-511), both of which were standardized. Reliability coefficients for BMI was r = .69 for males and r = .80 for females, respectively. Statistical analysis was conducted using IBM SPSS Version 26, with descriptive statistics (Mean, Standard Deviation) used to answer research questions and Analysis of Covariance (ANCOVA) to test hypotheses at a 0.05 alpha level. Findings revealed that there is no significant difference in the effect of moderate intensity interval and continuous training on the Body Mass Index (BMI) of male and female Sports Club Members in tertiary institutions in Bayelsa State. The authors recommended that the Tertiary Education Trust Fund (TETFund) should provide funding for sports clubs in tertiary institutions to enhance access to fitness programs that include moderate intensity interval and continuous training.

Keywords: Moderate intensity interval, Fitness level, Continuous training, Body mass index (BMI), Gender disparities

Introduction

Physical inactivity has been identified as one of the most significant global health issues in the twenty-first century, contributing to a heightened risk of adverse health conditions, including major non-communicable diseases (NCDs) such as coronary heart disease, type 2 diabetes, and certain cancers (World Health Organization [WHO], 2009). The World Health Organization (2009) reports that physical inactivity ranks as the fourth leading mortality factor globally, responsible for approximately 3.2 million deaths annually. Leem et al. (2012) and Kyu et al. (2016) further document that inactivity accounts for significant burdens of disease, including 6% of coronary heart disease and 10% of breast and colon cancer cases.

The association between physical inactivity and overweight or obesity poses a major concern globally (Leghemo et al., 2017). According to the WHO (2016), obesity is defined as abnormal or excess fat accumulation that impairs health, with individuals classified as

overweight having a Body Mass Index (BMI) of 25-29.9 kg/m² and those classified as obese having a BMI of 30 kg/m² and above. The prevalence of these conditions is rising alarmingly, with WHO (2018) reporting that 1.9 billion adults are overweight and 650 million are obese. This trend poses serious health challenges, especially in developing countries such as Nigeria, where changing lifestyles are contributing to an increasing burden of Non-Communicable disease (NCDs).

Health and fitness are vital components of adult life, and maintaining physical fitness can enhance life expectancy while reducing the risk of premature mortality. Physical fitness is characterized by the ability to perform daily activities with vigor and is linked to a lower risk of developing hypokinetic diseases (Paoli et al., 2015). Gender plays a crucial role in perceptions of body image and health behaviours, as societal norms often dictate differing expectations for men and women. In many cultures, women face pressure to conform to ideals of slimness, often leading to unhealthy dieting behaviours even when their weight is within a normal range (Okoro et al., 2014). Conversely, in some Nigerian cultures, including those in Bayelsa State, a preference for larger body sizes is prevalent, associating plumpness with beauty, wealth, and social status. This cultural acceptance can contribute to higher rates of obesity, particularly among women, who may feel societal pressure to attain these ideals (Okunbor et al., 2009).

Body composition is a critical health parameter, as an imbalance of lean body mass, and excess fat can lead to adverse health outcomes. Maintaining a healthy body composition is essential for reducing the risk of cardiovascular diseases and improving overall well-being. Body Mass Index is a widely used screening tool for assessing overweight and obesity, with evidence indicating that higher BMI levels correlate with increased health risks (Orsini et al., 2007; Zhu et al., 2005;) . Visceral fat, in particular, poses significant health risks, being closely linked to metabolic disorders and cardiovascular diseases (Leghemo et al., 2017).

Moderate intensity interval training (MIIT) has been identified as a time-efficient exercise strategy that may offer comparable health benefits to continuous training while promoting weight loss and improving metabolic health (Coombes & Skinner, 2014). As Bayelsa State navigates the complexities of cultural attitudes toward body image and health, this study aims to compare the effects of MIIT and continuous training on the Body Mass Index of Sports Club Members in tertiary institutions. By understanding these dynamics, the research seeks to inform effective strategies for promoting health and fitness, addressing the unique challenges posed by cultural perceptions of body size and gender in this region.

Objectives of the Study

The study investigated gender disparities in the impact of moderate-intensity interval and continuous training on Fitness Level and Body Mass Index (BMI) of Sports Club Members in tertiary institutions in Bayelsa State. Specifically, the study determined the:

1. effect of moderate intensity interval and continuous training on the Body Mass Index (BMI) of Sports Club Members in tertiary institutions in Bayelsa State; and
2. effect of moderate intensity interval and continuous training on the Body Mass Index (BMI) of male and female Sports Club Members in tertiary institutions in Bayelsa State.

Research Questions

The following research questions were raised to guide the study:

1. What is the effect of moderate intensity interval and continuous training on the Body Mass Index (BMI) of Sports Club Members in tertiary institutions in Bayelsa State?

2. What is the effect of moderate intensity interval and continuous training on the Body Mass Index (BMI) of male and female Sports Club Members in tertiary institutions in Bayelsa State?

Hypotheses

The following null hypotheses were postulated tand tested at .05 level of significance.

1. There is no significant difference between the effect of moderate intensity interval and continuous training on the Body Mass Index (BMI) of Sports Club Members in tertiary institutions in Bayelsa State.
2. There is no significant difference in the effect of moderate intensity interval and continuous training on the Body Mass Index (BMI) of male and female Sports Club Members in tertiary institutions in Bayelsa State.

Methods

The study employed a randomized pretest-posttest control group design. Both the control and experimental groups underwent a pretest where anthropometric parameters, including height, weight, Body Mass Index (BMI), were measured. The experimental groups then engaged in moderate intensity interval and continuous training sessions for a period of 12 weeks, while the control group did not participate in any training. After the training period, a posttest was administered to all groups, and the responses were compared to determine the effect of the training on fitness and BMI outcomes.

The population of the study comprised all 987 registered sports club members in Niger Delta University. The sample for the study consisted of 120 overweight adult volunteers (61 females and 59 males) residing in Bayelsa State. The participants were randomly assigned to two experimental groups and one control group using the fishbowl method. This involved placing slips of paper with group assignments into a bowl and drawing them randomly to ensure that both the control and experimental groups were equally represented. The experimental group was further divided into two equal halves, with one group participating in moderate intensity interval training and the other in continuous training.

The instruments used for data collection included a Stadiometer (SECA 217, Hamburg, Germany) to measure participants' heights and an Omron Karda Scan Body Composition Monitor (HBF-511, OMRON HEALTHCARE Co. Ltd., Japan) to measure weight, BMI. Both instruments are standardized, with documented validity and reliability. The Body Composition Monitor's validity coefficient for BMI is 0.69, for males and 0.80 for females (James et al., 2011). The reliability coefficients for BMI are 0.69 for males and 0.80 for females, respectively.

Data were analyzed using IBM Statistical Package for Social Science (SPSS) for Windows (Version 26). Descriptive statistics of mean ($\bar{x}$) and standard deviation (SD), were used to summarize the data pattern. The Analysis of Covariance (ANCOVA) was employed to test the research hypotheses at a 0.05 alpha level. The Cohen criterion was applied to interpret the eta value for the effect of moderate intensity interval and continuous training on participants, with values of 0.20-0.49 representing a small effect, 0.50-0.79 a medium effect, and $\geq$ 0.80 a large effect.

Results

Table 1**: Description of Pretest and Posttest Values for BMI (m^2/kg)**

Groups		Pre-BMI	Post-BMI	M.D	S.D	Decision
Experimental	(Continuous)	31.89	28.02	3.87	1.87	
Experimental	(Interval)	32.13	27.09	5.04	2.72	**Large effect**
Control		31.14	30.63	0.51	3.50	

The results of the study in Table 1. Indicate that participants in the experimental group I (continuous training) had a mean score of 31.89 m^2/kg at baseline (pretest) and a mean score of 28.02±3.87 m^2/kg as posttest mean score, with mean difference of 3.87 m^2/kg. The result in the Table also indicated that at baseline (pretest), the interval training group had a mean score of 32.13 m^2/kg and a posttest mean score of 27.09±2.72 m^2/kg, with mean difference of 5.04 m^2/kg. The study indicates a decrease in body mass index with moderate intensity interval training having a higher mean difference score (5.04 m^2/kg) than that of the continuous training (3.87 m^2/kg) after twelve weeks of training. The control group had a mean score of 31.14 m^2/kg at baseline and 30.62±3.50 m^2/kg as posttest mean score. Hence, moderate intensity interval and continuous training is said to have a very large effect on the body mass index of Sports Club Members in tertiary institutions in Bayelsa State.

Table 2: **Description of Pretest and Posttest Values based on Gender**

Groups	N	Pretest	Posttest	M.D	S.D	Decision
Male	59	13.33	11.50	1.83	2.01	
Female	61	14.12	11.15	2.97	2.05	**Large effect**

Table 2 shows that the male sports club members in the experimental group had a mean BMI of 13.33 in the Pretest and a BMI of 11.50±2.01 in the Posttest. Also, it was revealed that the female participants in the experimental group obtained a mean BMI of 14.12 in the Pretest and a mean BMI of 11.15±2.05 in the Posttest. This indicates that both training methods of moderate interval and continuous had a mean difference scores along gender lines when compared.

Table 3**: Analysis of Covariance Summary for Effect of Moderate Intensity Interval and Continuous Training on BMI**

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	13509.89	5	261.97	128.94	.000	**.862**
Intercept	7.23	1	7.23	3.56	.062	**.033**
Training	4.37	2	2.18	1.07	.345	**.020**
Training * BMI	1045.46	3	348.49	171.52	.000	**.833**
Error	209.26	103	2.032			
Total	93397.08	109				
Corrected Total	1519.16	108				

The results in Table 3. show an F value of 171.52 and a p-value of .000. The p-value (sig) is less than the selected alpha level of 0.05. The Table therefore showed a statistically significant difference (0.05). The null hypothesis which states that there is no significant difference between the effect of moderate intensity interval and continuous training on the Body Mass Index (BMI) of Sports Club Members in tertiary institutions in Bayelsa State was thus rejected.

Table 4: **Analysis of Covariance Summary for Effect of Moderate Intensity Interval and Continuous Training on Gender**

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	669.49	5	133.89	143.18	.000	**.874**
Intercept	42.18	1	42.18	45.10	.000	**.305**
Training	29.95	2	14.97	16.01	.000	**.237**
Training * Gender	658.28	3	219.42	234.64	.078	**.872**
Error	96.31	103	.93			
Total	15470.00	109				
Corrected Total	765.81	108				

The results in Table 4. show an F value of 234.64 and a p-value (sig) of .078. The p-value is greater than the alpha level of 0.05. The Table, therefore, showed a statistical non-significant difference. Thus, the null hypothesis which states that there is no significant difference in the effect of moderate intensity interval and continuous training on the Body Mass Index (BMI) of male and female Sports Club Members in tertiary institutions in Bayelsa State was not rejected.

Discussion

Effect of moderate intensity interval and continuous training on the Body Mass Index (BMI) of Sports Club Members

The results presented in Table 1 showed that participants in the continuous training group experienced a reduction in body mass index from the beginning to the end of the study period. Similarly, those in the interval training group also showed a decrease in body mass

index, with the reduction being more pronounced than that observed in the continuous training group after twelve weeks of training. In contrast, the control group exhibited only a slight change in body mass index between the pretest and posttest measurements. Also, the hypothesis revealed that there is a significant difference in the effect of moderate intensity interval and continuous training on the Body Mass Index (BMI) of Sports Club Members in tertiary institutions in Bayelsa State. This suggests that interval training, which involves repeated bursts of moderate exercise followed by low-intensity recovery, may be more efficient in reducing body fat and improving fitness levels in a shorter time-span. The control group, which did not participate in any training, showed minimal changes in BMI, further emphasizing the effectiveness of both training methods in reducing BMI.

These results have important implications for fitness and health interventions aimed at reducing obesity and improving physical fitness, particularly in tertiary institutions. The significant difference in BMI reduction between the two training modalities indicates that moderate intensity interval training could be a more time-efficient and effective option for individuals looking to improve their fitness and manage their weight. This could influence the design of exercise programmes in sports clubs and other health-focused institutions, encouraging a shift toward incorporating more interval-based training to maximize health outcomes. Additionally, the findings underscore the importance of structured physical activity interventions in combating obesity, especially in settings where sedentary lifestyles are prevalent. The findings of this study are similar to the findings of Ativie et al. (2018) on the impact of interval and continuous training on selected anthropometric, cardiovascular and metabolic indicators of overweight and obese females in Enugu which showed that, participants in the experimental groups of the study had a significant difference ($p<0.05$) in the value of the anthropometric parameter (Body Mass Index) of both training groups following a ten-week training programme. The significantly higher BMI reduction in the interval training group compared to the continuous and control groups can be attributed to the physiological intensity and metabolic demands of interval workouts. These findings align with existing literature such as Ativie et al. (2018), Skrypnik et al. (2015), and Khammassi et al. (2018), which support the superior efficacy of interval training for body composition improvement. The results also reinforce the importance of integrating time-efficient, structured physical activity into programs designed to tackle obesity and enhance fitness in academic settings and beyond.

Effect of moderate intensity interval and continuous training on the Body Mass Index (BMI) of male and female Sports Club Members

The findings in Table 2 indicate that both male and female sports club members in the experimental group experienced a reduction in body mass index following the intervention. Although female participants showed a slightly greater decrease than their male counterparts, the difference was not statistically significant. This suggests that moderate intensity interval training and continuous training were effective in reducing body mass index for both genders, and that gender did not significantly influence the outcome of the interventions.

These findings are consistent with those of Ativie et al. (2018), who investigated the effects of interval and continuous training on overweight and obese females and found significant reductions in BMI for both training types. Their research supports the idea that structured exercise, irrespective of the format, can positively affect anthropometric indicators. Similarly, Skrypnik et al. (2015) reported that structured aerobic and resistance training led to meaningful BMI and fat mass reduction in both male and female participants, indicating that gender-based variability in training outcomes is minimal when standardized protocols are followed. Further support comes from Khammassi et al. (2018), whose work on overweight adults revealed that both high-intensity interval and moderate continuous training improved body composition and metabolic health markers. Their study also highlighted that

sex differences did not significantly influence the outcomes of structured training interventions, which corroborates the present findings.

The implication of these results is significant for sports clubs and fitness program developers. Since both male and female participants responded similarly to the interventions, gender-specific modifications to training programs may not be necessary when targeting BMI reduction. This allows for the development of inclusive, uniform training regimens that can be applied to mixed-gender groups without compromising effectiveness. Additionally, such findings can help dispel common misconceptions about gendered exercise requirements and promote broader participation in structured physical activity programs.

The study reinforces the efficacy of moderate intensity interval and continuous training methods for reducing BMI across genders and aligns with established literature indicating minimal gender disparity in response to structured physical interventions. It also underscores the value of universal exercise prescriptions for weight management in community and institutional settings.

Conclusion

The findings from this study highlight the effectiveness of both moderate intensity interval and continuous training in reducing Body Mass Index (BMI) among overweight adults and sports club members in tertiary institutions in Bayelsa State. Both training methods decreased BMI, with moderate intensity interval training showing a slightly higher mean difference compared to continuous training. This demonstrates the potential of time-efficient moderate intensity interval training to offer similar or superior benefits to continuous training in terms of fitness and weight management. Moreover, the results indicate no significant difference in the effect of these training methods across gender lines, suggesting that both males and females can benefit equally from such interventions. This reinforces the notion that gender-specific adjustments may not be necessary when the goal is BMI reduction, making these training programs widely applicable in fitness and sports settings. Overall, the study provides valuable insights for the design of effective, inclusive, and accessible training interventions that can address obesity and fitness concerns in various populations.

Recommendations

Based on the findings of the study, the following recommendations were postulated:
1. The Ministry of Health should collaborate with local fitness centers to promote moderate intensity interval and continuous training programmes for weight management and overall health improvement.
2. The Tertiary Education Trust Fund (TETFund) should provide funding for sports clubs in tertiary institutions to enhance access to fitness programs that include moderate intensity interval and continuous training.

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