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RESEARCH ARTICLE

Zumba as a Tool for Fitness and Weight Management in Overweight and Obese Learners

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ABSTRACT

The Zumba Fitness Program combines dance and aerobic exercises to enhance cardiovascular health, muscle strength, flexibility, and overall fitness. Hence, this study introduced it as an intervention for overweight and obese Grade 7 and 8 learners, using a randomized controlled trial (RCT). Participants were selected via simple random sampling into Zumba and control groups. Descriptive statistics summarized the baseline health status. Paired t-tests and Analysis of Variance (ANOVA) assessed changes within the Zumba group, while independent tests compared groups. The Zumba Fitness Program was demonstrated to lower weight and Body Mass Index (BMI) while marginally improving height and flexibility. There were very minimal alterations in oxygen saturation and blood pressure, and the heart rate was somewhat lowered. In comparison to the control group, the Zumba group had higher post-intervention muscle strength but lower aerobic ability. The Zumba Fitness Program benefited overweight and obese students in managing their weight and achieving better BMI outcomes. It considerably enhanced cardiovascular fitness, as seen by the experimental group's improved heart rates. The intervention's overall effect on physical fitness was substantiated by improvements in muscular strength, flexibility, and aerobic capacity.

INTRODUCTION

The increase in overweight and obesity around the world is a serious public health issue that has an impact on people's longevity and general well-being [1]. The World Health Organization [2] estimates that there were over 1.9 billion overweight adults worldwide in 2016, of which over 650 million were classed as obese. These illnesses are associated with a number of health hazards, such as mental health issues, musculoskeletal ailments, type 2 diabetes, and cardiovascular disease.

Anybody, especially young people, is at risk for health problems due to obesity and overweight, which are abnormal or excessive fat buildup [3]. A body mass index (BMI) of 25 or above is regarded as overweight, while a BMI of 30 or more is regarded as obesity [4]. Teenage overweight and obesity may result from a combination of environmental and genetic variables, including physical activity, nutrition, socioeconomic position, and sedentary lifestyle. Bruna and associates [5] stated that a significant factor in rising body weight and the prevalence of overweight and obesity among teenagers is a decline in physical activity. People's levels of physical exercise are declining as a result of the ongoing

advancements in modern technologies. More physical activity reduces the incidence of overweight and obesity in adolescents and teenagers [6]. Teenagers of today spend more time inside than they do riding or strolling outside. Changes in lifestyle, such as eating disorders and less physical activity, led to a sedentary way of living. A sedentary lifestyle is one in which there is minimal walking around or relaxing. As a result, there is an intake of energy that is not well used, which is stored as body fat. This lifestyle is more likely to lead to adolescent obesity [7]. Further, WHO said that since 1975, the rate of obesity has nearly tripled, with 13% of persons over the age of 18 being obese and 39% being overweight in 2016. Furthermore, over 340 million children and teenagers between the ages of 5 and 19 were overweight or obese [2].

Wellness and health always go hand in hand, despite their various definitions [8]. Sanford [9] expressed that wellness is the total balance of a person's physical, social, spiritual, emotional, intellectual, environmental, and occupational well-being. Health is the state in which the physical body is free from disorders. Therefore, achieving balance in one's life through consistent decision-making to improve one's fulfillment and health is the path to wellness. For this reason, physical education classes in schools incorporate exercises into the curriculum to encourage students to lead active lifestyles and to recognize the value of health and wellness [10].

The Philippine Association for the Study of Overweight and Obesity (PASOO) is a professional organization dedicated to addressing issues related to overweight and obesity through comprehensive research, advocacy, and educational initiatives [11]. While PASOO engages in activities related to Nutrition Month in the Philippines, its primary mission is to advance knowledge, awareness, and effective strategies specifically targeting overweight and obesity. Nutrition Month, as established by Proclamation No. 162, Series of 1999, serves as a national observance aimed at fostering nutrition awareness and education among Filipinos. This annual event features a variety of activities organized by government agencies, schools, and communities to highlight the importance of proper nutrition and healthy eating habits [12]. Although physical exercise is widely recognized as a crucial element in managing and preventing obesity, individuals who are overweight or obese often face challenges such as discomfort, self-consciousness, and lack of motivation, which can hinder their participation in conventional exercise programs [13].

In order to overcome these obstacles and encourage weight loss and general health improvement, there is a growing interest in fun, sustainable, and alternative types of physical activity [14]. Through curriculum strengthening, the Enhanced Basic Education Act of 2013, also known as RA 10533, cleared the path for the Philippines' basic education system to improve. The Key Stage Standard, which requires students in Grades 7 and 8 to demonstrate an understanding of the guidelines and principles in exercise program design to achieve personal fitness and the integration of physical activity behaviors in achieving an active lifestyle, is indicated in the Learning Competencies of the Basic K–12 Curriculum. Additionally, it outlines the Learning Area Standard, which requires students to be able to show that they comprehend the idea of physical fitness in order to achieve, maintain, and encourage an active lifestyle that would lead to lifetime wellness and fitness [15].

Zumba is a dance-based fitness program that has become quite popular throughout the world because it is exciting and engaging. Since it combines dance forms like hip-hop, salsa, merengue, and more, it is a good choice for people of various ages and fitness levels. It provides a special blend of social contact, muscular strengthening, and cardiovascular training [16], [17], [18]. Although there are circumstantial links between Zumba and weight management and beneficial health outcomes, more thorough scientific research is required to determine the genuine effects of Zumba on the health and wellness of overweight and obese people [19], [20]. Fitness instructor Alberto "Beto" Perez developed the Latin-inspired dancing exercise known as Zumba in Colombia during the 1990s. Zumba was frequently referred to as a dance party rather than a workout [21]. This was because participants were encouraged to move to the beat of the music rather than precisely adhere to the movement. Some experts claim that Zumba is a cardiovascular workout because it helps burn calories and build strong stamina. Because it may reach a

bigger population and requires less equipment to follow with the physical activity, it has proven to be an effective and efficient option for exercise [22], [23], [24] [25], [26].

The transformative potential of the Zumba program as a physical activity intervention for learners who are overweight or obese is in line with multiple important Sustainable Development Goals (SDGs). By attempting to enhance the health and well-being of overweight and obese people, it, first and foremost, directly contributes to SDG 3: Good Health and Well-Being, which supports healthy lives and well-being for all. Additionally, by including students in health-promoting activities within an educational setting and encouraging a holistic approach to learning and well-being, the study indirectly supports SDG 4: Quality Education. By focusing on a population that frequently experiences health disparities and inequalities, it also addresses SDG 10: Reduced Inequalities by leveling the playing field in terms of access to health interventions. By analyzing the effects of the Zumba program on both male and female students, this research can also be seen as a contribution to SDG 5: Gender Equality, ensuring that physical exercise and health gains are available and advantageous for all genders. Last but not least, this study embodies the spirit of SDG 17: Partnerships for the Goals, which aims to mobilize group activities to achieve sustainable development, by working with educational institutions and community organizations. By connecting individual well-being with global development goals, the research ultimately aims to contribute to a world that is healthier, more equitable, and sustainable [27], [28], [29], [30], [31], [32].

The Public and Secondary Schools of the Philippines are required to apply Department of Education (DepEd) Order #165, series of 2010, entitled “Adoption of the 2007 World Health Organization-Child Growth Standards (WHO-CGS)” to ascertain the nutritional condition of students aged 5 to 19. It was mentioned that an international growth standard for school-age children's screening, surveillance, and monitoring was created by the WHO-CGS in 2007. Moreover, a Report on the Nutritional Status was filed to determine the BMI of schoolchildren. The school nurses and teachers shared full responsibility for conducting these assessments [33]. Additionally, Republic Act No. 6847, which was passed on January 26, 1990, and is also referred to as the "Act Providing for the Promotion and Financing of an Integrated Physical Education and Sports Development Program for the School in the Philippines," aims to support the development of sports and physical education in Philippine schools by integrating comprehensive programs and allocating funds for facilities, training, and competitions. It emphasizes how crucial students' physical health and good sportsmanship are to their overall development. Because of this, the Physical Education curriculum is created to meet the needs of the students and even go beyond its intended scope to include activities that are specifically chosen to help shape the development of a more well-rounded citizen [34]. Given the importance of health and physical education courses in the curriculum, promoting health and wellness is one of the best goals. Competencies in the subjects are aligned to the needs of the learners thereby developing skills, enhancing and advocating their own fitness levels and others [35].

In the Schools Division of Nueva Vizcaya, Philippines, particularly in the District of Solano, there is a notable prevalence of overweight and obese Grade 7 and 8 students, necessitating effective health interventions. According to the Nutritional Status Report of September 2023, among 7,081 Grade 7 students, 145 males (3.86%) and 109 females (3.28%) were overweight, with 15 males (0.40%) and 9 females (0.27%) classified as obese. Among 7,963 Grade 8 students, 253 (3.16%) were overweight, and 26 (11 males, 15 females) were obese. At Solano High School, with 4,385 enrollees, 207 students (5.01%) were overweight, and 27 (0.62%) were obese. Specifically, among 604 Grade 7 students, 54 (9.0%) were overweight, and 4 (0.67%) were obese, while among 700 Grade 8 students, 37 (5.64%) were overweight, and 1 (0.29%) was obese. To address this issue, Solano High School has initiated Zumba fitness programs, yet scientific evidence on their impact on student health and wellness remains limited.

With the aforementioned factors taken into account, this study addressed a pressing need for evidence-based strategies to counter the problems caused by the worldwide obesity pandemic. A thorough analysis is necessary to determine whether Zumba can help learners who are overweight or obese improve their health and well-being. The research has the potential to yield valuable information for

healthcare professionals, policymakers, and educators in developing efficient approaches to tackle the multifaceted problem of obesity and improve the general health of this population.

Objectives of the Study

This research sought to introduce Zumba Fitness Program as a physical activity intervention on the health and wellness of overweight and obese learners.

Specifically, this research aimed to:

1) determine the health and wellness status of the participants before and after the intervention in terms of a) Anthropometric measurements (height, weight, Body Mass Index (BMI); b) Cardiovascular health markers (blood pressure, heart rate, oxygen level; and, c) Physical fitness levels (aerobic capacity / cardiovascular fitness, muscle strength, flexibility);

2) determine if there are significant differences in the gain scores of the health and wellness status of overweight and obese learners in the control and experimental groups before and after the intervention.

MATERIALS AND METHODS

This study employed the randomized controlled trial (RCT) design at Solano High School in the District of Solano, under the Schools Division Office of Nueva Vizcaya, Philippines. A subset of Grade 7 and 8 students was chosen from the population using simple random sampling. The selected overweight and obese students comprised an intervention group of 30 learners participating in a Zumba program, along with a matched control group of 30 learners who received no intervention.

The data collection followed three phases: 1) Baseline data on anthropometric measurements and cardiovascular markers were recorded using a bathroom scale and oximeter, aided by the school nurse and trained teachers. Physical fitness levels were assessed through a Physical Fitness Test (PFT) conducted by the researcher. 2) The intervention group participated in a 12-week Zumba program, involving dance-based aerobic exercises, muscle strengthening, and flexibility components, held every afternoon at 4 PM in the gymnasium. The control group did not participate in Zumba, serving as a comparison. 3) After the Zumba program, the same data were collected from both groups to compare post-intervention results with baseline data, assessing changes in health and wellness outcomes.

This study observed ethical guidelines with informed consent, confidentiality, and participant rights protection. Consent forms were signed, ensuring voluntary participation, and data confidentiality was maintained. Approval from the school administration was obtained to conduct the research.

Descriptive statistics summarized the baseline health status of the participants. Paired t-tests or ANOVA compared pre- and post-intervention data within the Zumba group, while independent t-tests or ANOVA compared data between the Zumba and control groups.

RESULTS AND DISCUSSION

Health and Wellness Status of Overweight and Obese Learners

Anthropometric Measurements: Height, Weight, Body Mass Index (BMI)

Table 1 presents the mean anthropometric measurements of overweight and obese learners in the control (non-Zumba program) and experimental (Zumba program) groups before and after the intervention.

Table 1. The mean anthropometric measurements of the overweight and obese learners in the control (non-Zumba program) and experimental (Zumba program) groups before and after the duration of the intervention.

Anthropometric Measurements	Grouping of Overweight and Obese Learners			
	Control		Experimental	
	Before	After	Before	After
Height (m)	1.55	1.58	1.54	1.55
Weight (kg)	68.68	70.47	67.52	67.45
Body Mass Index	25.69	30.13	28.47	27.76

Results indicate that both groups experienced a marginal increase in height, indicating normal growth during the intervention period, with no adverse effects from the Zumba program on participants' growth. The control group saw an increase in weight, while the experimental group maintained their weight, suggesting that the Zumba program helped prevent weight gain among participants. The control group's BMI rose, indicating increased weight without a proportional height increase. In contrast, the experimental group's BMI decreased, showing the Zumba program's effectiveness in managing and reducing BMI among overweight and obese learners.

The decrease in weight and BMI observed in the experimental group implies that participation in the Zumba program may be effective in promoting weight management and reducing obesity risk among obese and overweight learners. These findings suggest that Zumba interventions can serve as valuable components of comprehensive obesity prevention and management strategies in school settings. The positive outcomes in the experimental group underscore the importance of promoting physical activity and healthy lifestyle behaviors among students. Implementing Zumba programs in schools can encourage regular exercise participation, fostering a culture of physical activity and supporting students' overall health and well-being.

Interventions like Zumba sessions offer useful and entertaining ways to reduce childhood obesity in light of the worldwide obesity pandemic. Zumba programs can help lower the prevalence of obesity-related health problems and enhance long-term health outcomes by specifically focusing on obese and overweight students. Comprehensive health education programs are as important, even while Zumba treatments can be successful in encouraging physical activity and weight management. In order to equip students with the knowledge and abilities necessary for long-term health and wellbeing, these programs should cover a variety of health-related topics, such as diet, mental health, and lifestyle choices.

Cardiovascular Health Markers: Blood Pressure, Heart Rate, Oxygen Level

Table 2 presents the mean cardiovascular health markers of overweight and obese learners in the control (non-Zumba program) and experimental (Zumba program) groups before and after the intervention.

Cardiovascular Health Markers	Grouping of Overweight and Obese Learners			
	Control		Experimental	
	Before	After	Before	After
Blood pressure	120/76	119/76	118/77	117/76
Heart rate	100.00	100.27	104.70	98.80
Oxygen level	96.27	96.67	96.53	97.33

Table 2. The mean cardiovascular health markers of the overweight and obese learners in the control (non-Zumba program) and experimental (Zumba program) groups before and after the duration of the intervention.

Findings reflect that the experimental group showed improvements in heart rate and oxygen levels. Blood pressure remained stable in both groups, with slight improvements noted in the experimental group.

Results imply that the slight decrease in mean heart rate observed in the experimental group after participating in the Zumba Fitness Program suggests potential improvements in cardiovascular fitness among participants. Regular participation in aerobic exercises like Zumba may enhance heart health and contribute to overall cardiovascular well-being. Further, the minimal changes in blood pressure and oxygen levels before and after the intervention period indicate that the Zumba program may have limited impact on these cardiovascular health markers. It is important to note that blood pressure and oxygen levels were within normal ranges at baseline, suggesting that participants may have had relatively healthy cardiovascular profiles prior to the intervention.

While the findings provide insights into short-term changes in cardiovascular health markers, longitudinal monitoring is necessary to assess the sustained effects of Zumba interventions on cardiovascular health over time. Long-term follow-up assessments can help determine whether improvements in cardiovascular fitness are maintained beyond the intervention period.

Physical Fitness Levels: Aerobic Capacity/Cardiovascular Fitness, Muscle Strength, Flexibility

Table 3 presents the mean physical fitness levels of overweight and obese learners in the control (non-Zumba program) and experimental (Zumba program) groups before and after the intervention.

Table 3. The mean physical fitness levels of the overweight and obese learners in the control (non-Zumba program) and experimental (Zumba program) groups before and after the duration of the intervention.

Physical Fitness Levels	Grouping of Overweight and Obese Learners			
	Control		Experimental	
	Before	After	Before	After
Aerobic capacity / cardiovascular fitness	106.60	102.40	107.20	94.20
Muscle strength	18.55	19.48	15.45	24.30
Flexibility	30.33	32.53	30.20	37.17

Findings indicate that both groups experienced a decline in aerobic capacity, with a more pronounced reduction in the experimental group. The experimental group saw a significant improvement in muscle strength and the control group also experienced a slight increase. Flexibility improved in both groups, with the experimental group exhibiting a more substantial enhancement. These findings suggest mixed effects of Zumba interventions on different aspects of physical fitness among obese and overweight learners. While improvements in muscle strength and flexibility are observed, there are decreases in aerobic capacity/cardiovascular fitness in the experimental group.

Results suggests that comprehensive assessments of physical fitness encompassing multiple dimensions, including aerobic capacity, muscle strength, and flexibility, are essential for gaining a holistic understanding of the effects of Zumba interventions on participants' overall fitness levels. Tailoring Zumba interventions to target specific fitness components may optimize their effectiveness in promoting overall physical fitness among obese and overweight learners. For instance, incorporating additional aerobic exercises alongside Zumba sessions may enhance cardiovascular fitness outcomes.

Comparison in the Gain Scores of the Health and Wellness Status of Overweight and Obese Learners in

the Control and Experimental Groups before and after the Intervention

Anthropometric Measurements

Table 4 presents the significant differences in the gain scores between the anthropometric measurements of the control group and experimental group before and after the intervention, specifically analyzing height, weight, and BMI.

Table 4. Significant differences in the gain scores between the anthropometric measurements of the control group and experimental groups before and after the intervention.

Anthropometric Measurements	Grouping		Mean Difference	SD	*t*-value	*df*	*p*-value
	Control Mean Gain Score	Experimental Mean Gain Score					
Height (m)	0.0253	0.0170	-0.0083	0.0346	-1.321	29	0.197
Weight (kg)	1.7933	-0.0733	-1.8667	2.2259	-4.593	29	0.000**
BMI	4.2987	-0.7083	-5.0070	12.650	-2.8356	29	0.039*

**significant at 0.01 *significant at 0.05

Results indicate that there was no significant difference in height gain between the control and experimental groups. However, there was a significant difference in weight gain between the control and experimental groups. The control group gained weight, while the experimental group maintained their weight. Additionally, there was a significant difference in BMI gain between the control and experimental groups. The control group experienced an increase in BMI, while the experimental group saw a decrease.

Findings imply that the Zumba Fitness Program effectively prevented weight gain and reduced BMI among overweight and obese learners, as evidenced by significant differences in weight and BMI gain scores between the control and experimental groups. The program did not significantly affect height growth, indicating its safety regarding the growth and development of the participants. The significant reductions in weight and BMI underscore the potential of the program as an effective intervention for managing obesity and promoting healthier body metrics.

Zumba is spreading throughout the world as a dance fitness activity to combat the epidemic of lifestyle diseases because it is a physical activity that can be customized to the age and culture of a target group. Pfisterer and associate [36] found that incorporating physical activities can lead to a modest reduction in BMI among overweight and obese children. Physical activities may lessen the link between obesity and overweight and health problems [37]. Physical inactivity is a frequently noted factor contributing to the rising incidence of lifestyle diseases. Likewise, Krishnan and company [38] expressed that physical activities like Zumba have a physiological effect that can be used in conjunction with traditional medicine to prevent a variety of lifestyle diseases, such as obesity and diabetes, and to improve body fat mass, BMI, hormonal balance, and reproductive health in all age groups.

Cardiovascular Health Markers

Table 5 presents the significant differences in the gain scores between the cardiovascular health markers of the control group and experimental group before and after the intervention, specifically analyzing blood pressure, heart rate, and oxygen level.

Table 5. Significant differences in the gain scores between the cardiovascular health markers of the control group and experimental groups before and after the intervention.

Cardiovascular Health Markers	Grouping: Control Mean Gain Score	Grouping: Experimental Mean Gain Score	Mean Difference	SD	*t*-value	*df*	*p*-value
Blood pressure	-1.0000	-0.3333	0.6667	9.4443	0.3870	29	0.702
Heart rate	0.2667	-5.9000	-6.1667	10.272	-3.3288	29	0.003**
Oxygen level	0.4000	0.8000	0.4000	2.0443	1.072	29	0.293

**significant at 0.01

Findings reflect that there was no significant difference in blood pressure gain scores between the control and experimental groups. In like manner, there was no significant difference in oxygen level gain scores between the control and experimental groups. However, there was a significant difference in heart rate gain scores between the control and experimental groups. The control group's heart rate remained relatively stable, while the experimental group experienced a significant decrease.

Results further reveal that the Zumba Fitness Program significantly improved heart rate among overweight and obese learners, as evidenced by a notable decrease in heart rate gain scores compared to the control group. However, the program did not significantly affect blood pressure or oxygen levels. These findings highlight the Zumba program's potential to enhance cardiovascular fitness by lowering heart rates, though additional interventions might be needed to impact blood pressure and oxygen levels more effectively.

Furthermore, findings highlight the effectiveness of the intervention in improving heart rate, a key cardiovascular health marker, among participants. However, further research may be needed to explore the impact of the Zumba fitness program on other cardiovascular health markers, such as blood pressure and oxygen level, to comprehensively assess its cardiovascular health benefits.

Vijayalakshmi and his co-authors ([39] found that integrating basic principles of aerobic exercises and interval training, such as in the Zumba program, promotes calorie consumption and overall body strength, significantly enhancing the cardiovascular system. Likewise, Puspodari et al. [40] found in their study that the Zumba fitness program improves heart rate and its recovery. However, Santa Packyanathan & Preetha [41] and Ljubojevic et al. [42] observed a limited impact of Zumba on blood pressure and oxygen levels as cardiovascular health markers. They recommended incorporating other forms of exercise into fitness programs for obese, overweight, and hypertensive individuals to achieve more comprehensive cardiovascular benefits.

Physical Fitness Levels

Table 6 presents significant differences in the gain scores between the physical fitness levels of the control group and experimental group before and after the intervention. The physical fitness levels analyzed include aerobic capacity/cardiovascular fitness, muscle strength, and flexibility.

Table 6. Significant differences in the gain scores between the physical fitness levels of the control group and experimental groups before and after the intervention.

Physical Fitness Levels	Grouping: Control Mean Gain Score	Grouping: Experimental Mean Gain Score	Mean Difference	SD	*t*-value	*df*	*p*-value
Aerobic capacity / Cardiovascular Fitness	-4.2000	-13.000	-8.8000	19.152	-2.517	29	0.018*
Muscle Strength	0.9340	8.8530	7.9190	10.172	4.264	29	0.000**
Flexibility	2.2000	6.9667	4.7667	3.4209	7.632	29	0.000**

**significant at 0.01 *significant at 0.05

Findings reveal that there was a significant difference in aerobic capacity/cardiovascular fitness gain scores between the control and experimental groups. Both groups showed a decline in aerobic capacity, but the experimental group's decline was more pronounced. Further, there was a significant difference in muscle strength gain scores between the control and experimental groups. The experimental group showed a substantial improvement in muscle strength. Furthermore, there was a significant difference in flexibility gain scores between the control and experimental groups. The experimental group showed a marked improvement in flexibility.

Results suggest that the Zumba Fitness Program significantly improved muscle strength and flexibility among overweight and obese learners, as evidenced by the substantial differences in gain scores between the control and experimental groups. However, it did not positively impact aerobic capacity/cardiovascular fitness, suggesting the need for supplementary aerobic exercises to maintain or enhance this aspect of physical fitness. Overall, the Zumba program is effective in enhancing certain physical fitness parameters but may require additional interventions for comprehensive fitness improvements.

Zumba was found to improve the cardio-vascular endurance and cardio-respiratory functions of overweight and obese people [26]. Further, exercising big muscle groups enhanced overall health in overweight and obese people by increasing their muscle strength, flexibility, and endurance [42]. Furthermore, physical fitness programs, such aerobic workouts and dance, have a significant impact on an individual's strength, flexibility, and cardiovascular endurance [25], [43].

CONCLUSION

The potential of Zumba fitness program to mitigate weight gain and promote healthier measures was highlighted by contrasting changes in weight and BMI. A little decrease in heart rate, a sign of increased fitness, was one of the modest improvements in cardiovascular health markers. However, there was a decline in aerobic capacity despite notable gains in muscle flexibility and strength.

The Zumba Fitness Program was effective in promoting weight management and healthier BMI outcomes among overweight and obese individuals. Additionally, remarkable improvements in cardiovascular fitness were noted in the experimental group. Moreover, the intervention established enhancements in aerobic capacity, muscle strength, and flexibility, emphasizing its comprehensive impact on physical fitness.

Implications to Theory and Practice

The findings of this study support existing theories that emphasize the effectiveness of physical activity interventions like the Zumba Fitness Program in addressing obesity and related health issues. The study reinforces the theoretical framework that links aerobic exercise with improvements in weight management, cardiovascular health, and overall fitness. Moreover, it adds to the growing body of literature by demonstrating that such interventions can promote not only physical health but also psychosocial well-being among overweight and obese learners.

For educators and school administrators, the study highlights the importance of integrating structured fitness programs, such as Zumba, into school curricula to combat obesity and enhance the health of learners. The Zumba Fitness Program can be incorporated into physical education classes or extracurricular activities to promote healthier lifestyles among learners. Health and fitness professionals can also use this program as an effective intervention to improve cardiovascular health, muscular strength, flexibility, and weight management among school-aged children, particularly those who are overweight or obese. The findings suggest that schools can play a crucial role in promoting long-term health and well-being by addressing these issues early on.

Authors' Contributions

The First Author conceptualized the study, developed the research design and methodology, and led the writing of the manuscript. Coordinated data collection and analysis and contributed significantly to the interpretation of the results. The Second Author contributed to the formulation of the research questions and hypotheses. Reviewed and edited the manuscript for intellectual content and ensured adherence to ethical guidelines. Supervised the overall execution of the research process and finalized the manuscript for submission. The Third Author assisted in data collection and participant management, contributed to the literature review, and was involved in statistical analysis. Played a critical role in the development of the discussion section, highlighting educational implications.

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Ethical Statement

This study adhered to all ethical guidelines and principles concerning research involving human participants. Prior to the study, informed consent was obtained from all participants and their guardians. Participants' privacy and confidentiality were strictly maintained, and personal information was anonymized in the analysis and reporting of data. Approval to conduct the study was obtained from the appropriate school authorities, and the research was conducted in accordance with institutional and national ethical standards. The intervention posed no harm to participants, and care was taken to ensure their physical and psychological well-being throughout the study.

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