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Effects of Six Weeks Exercise Programme on Certain Physiological Parameters among Obese Students in Ignatius Ajuru University of Education, Port Harcourt

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A B S T R A C T
This study examined the effects of six-weeks exercise programme on certain physiologic parameters among overweight and obese undergraduate students in Ignatius Ajuru University of Education, Port Harcourt, Rivers State. A quasi-experimental research design was adopted for the study. A sample size of 62 overweight and obese undergraduate students was used for the study. The instrument for data collection was a self-structured pro-forma titled effect of six-weeks exercise on physiologic parameters (E6-WEPP) questionnaire with 0.77 coefficient of reliability. Data was analysed using frequency counts, percentages, mean and standard deviation while the hypotheses were tested using Paired-Sample t-test at 0.05 alpha level of significance. Findings of the study revealed the mean body mass index prior to six-weeks exercise intervention was 31.21±6.63kg/m2; while the post intervention mean body mass index was 27.37±4.95kg/m2 among overweight and obese undergraduate students. The mean thigh circumference was 76.37±34.19cm prior to exercise intervention and 73.16±33.71cm post intervention. The mean abdominal circumference was 107.55±40.09cm prior to intervention and 100.72±42.19cm after the six-weeks of exercise intervention. The mean hip circumference was 117.30±30.02cm and 116.32±31.85cm prior and post six-weeks of exercise intervention; and the mean waist circumference was 108.93±38.46cm prior to six-weeks exercise and 103.16±41.25cm at post intervention. Furthermore, the paired samples t-tested analysis revealed six-weeks exercise programme significantly affected body mass index (t= -11.282; p= 0.000); thigh circumference (t= -5.795; p= 0.000); abdominal circumference (t= -4.951; p= 0.000); hip circumference (t= -4.606; p= 0.000); and waist circumference (t= -2.960; p= 0.004) among overweight and obese undergraduate students of Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, Rivers State. It was recommended that students should be encouraged to prioritise physical exercise while university management provide needed opportunities for students to incorporate ergonomic bike exercise into their daily routines for proper weight management and promotion of healthy living.

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Introduction

Obesity is one of the leading non-communicable diseases of global public health significance and has more than tripled among adults over the past three decades, according to the World Health Organization (WHO, 2024). It is a complex, multifactorial metabolic disorder arising from the interaction of genetic, nutritional, environmental, economic, and socio-cultural factors, as well as a sustained positive energy balance in which energy intake exceeds energy expenditure, resulting in excessive fat accumulation and increased adiposity (Naigaga et al., 2018; Ayogu et al., 2022). Globally, the prevalence of overweight and obesity has increased markedly over the past four decades, with nearly three billion individuals currently classified as overweight or obese (World Obesity, 2024).

Evidence indicates that more than 12% of urban young adults are obese, with an estimated annual increase of 8%, largely attributed to high consumption of carbohydrate-, fat-, and protein-dense foods alongside inadequate intake of fruits and vegetables (Joe, 2022). These dietary imbalances are further compounded by increasingly sedentary lifestyles facilitated by technological advancement and convenience. Consequently, obesity has emerged as one of the most critical nutritional and lifestyle-related challenges among young adults in both developed and developing countries (Ukegbu et al., 2017; Joe, 2022; Abbasifard et al., 2023). Rapid urbanisation and lifestyle transitions have contributed to reduced physical activity levels, leading to adverse physiological and psychological outcomes among youths who subsequently transition into obese adulthood (Chooi et al., 2019; Jebeile et al., 2022). As a result, approximately one-third of the global young adult population is predisposed to chronic non-communicable diseases, including asthma, cardiovascular disease, diabetes mellitus, hypertension, bone disorders, and several obesity-related cancers such as colorectal, endometrial, gallbladder, kidney, liver, oesophageal, pancreatic, and post-menopausal breast cancers (Vucenik & Stains, 2012; Pati et al., 2023).

The majority of young adults are enrolled in colleges and universities (OECD, 2014; 2023), where certain lifestyle behaviours associated with studentship—such as frequent consumption of high-fat and sugar-rich foods, short sleep duration, late-night eating, and prolonged sitting during lectures and practical sessions—have been shown to increase the risk of excessive adiposity (Al-Sabbah, 2020; Obirikorang et al., 2024; Telleria-Aramburu & Arroyo-Izaga, 2022;). Notably, first-year university students tend to experience significant weight gain, which continues progressively throughout subsequent years of study (Obirikorang et al., 2024). Gender disparities in obesity prevalence have also been reported, with higher rates observed among female undergraduate students compared with their male counterparts (Jiang et al., 2019; Oluwasanu et al., 2023).

Obesity among university students is further exacerbated by poor dietary and eating habits. Unhealthy behaviours, including frequent meal replacement with high-calorie snacks, excessive fast-food consumption, intake of energy-dense and salt-rich diets, and a gradual shift away from traditional healthy diets, are commonly reported within this population (Grabež et al., 2018; Al-Sabbah, 2020; Telleria-Aramburu & Arroyo-Izaga, 2022). Additionally, practices such as skipping breakfast or substituting lunch with high-calorie snacks may lead students to perceive inadequate nutrient intake, thereby increasing reliance on dietary supplements to compensate for presumed deficiencies (Kobayashi et al., 2017; Ma et al., 2020).

Excessive sedentary behaviour is also prevalent among university students, often characterised by poor sit-to-stand ratios (Jerome et al., 2017; Moulin & Irwin, 2017). Studies indicate that students spend approximately 30–50 hours per week sitting during lectures, examination preparation, presentations, and assessments, with sedentary time increasing by an estimated 75 minutes per day from the first to the final year of study (Benzo et al., 2016; Jerome et al., 2017; Moulin & Irwin, 2017; Castro et al., 2020). Furthermore, leisure time is frequently dominated by screen-based activities such as social media use, video streaming, and gaming, further compounding physical inactivity (Castro et al., 2020). Collectively, the university environment and structured academic schedules may inadvertently promote sedentary lifestyles and associated comorbidities among students (Deliens et al., 2015; Castro et al., 2018; 2020).

The adverse effects of physical inactivity among university students can be mitigated through deliberate engagement in structured physical exercise. Exercise is defined as a subset of physical activity that is planned, structured, and repetitive, and is performed with the objective of improving or maintaining

physical fitness, health, and overall well-being (Santos et al., 2020; Cooper & Blair, 2024). While physical activity encompasses any bodily movement that results in energy expenditure, exercise specifically targets health-related fitness outcomes (Borodulin & Anderssen, 2023; Mayfield & Bobb, 2023).

The World Health Organization (WHO, 2022) recommends that adults engage in 150–300 minutes of moderate-intensity physical activity or 75–150 minutes of vigorous-intensity exercise per week, with each session lasting at least 10 minutes. Exercise intensity is commonly classified using metabolic equivalents of task (METs), where light-intensity activity corresponds to 1.5–3 METs (e.g., standing or slow walking), moderate-intensity activity to 3–6 METs, and vigorous-intensity activity to greater than 6 METs. One MET represents resting energy expenditure and is equivalent to approximately 3.5 mL $O_2 \cdot kg^{-1} \cdot min^{-1}$ (Borodulin & Anderssen, 2023).

Exercise type and intensity vary according to individual preferences, fitness goals, and physical capabilities. Among university students, commonly practiced aerobic activities include brisk walking, jogging, swimming, cycling, dancing, breathing exercises, and pelvic floor exercises (Alkhateeb et al., 2019; Kljajević et al., 2022; Pan et al., 2022). Beyond improving physical fitness, exercise participation among students has been associated with relief from musculoskeletal discomfort caused by prolonged sitting, as well as enhanced functional capacity and overall well-being (Karatrantou & Gerodimos, 2024; Sortino et al., 2024).

An ergonomic bike, also referred to as a stationary exercise bike, is a fixed indoor cycling device designed to simulate bicycle riding without functional wheels (Chikara, 2023). Ergonomic cycling is a widely practiced indoor exercise across fitness centres and is suitable for individuals of varying ages and health statuses (Chavarrias et al., 2019). Given the sedentary demands of academic schedules, university students may adopt ergonomic bike exercise as an accessible strategy to counteract physical inactivity. Evidence suggests that low-intensity ergonomic cycling during lecture periods can positively influence academic performance, reduce weekly sedentary time, increase physical activity levels, enhance well-being, and alleviate academic-related fatigue (Joubert et al., 2017; Lynch et al., 2022). Additionally, cycling has been shown to improve muscular strength, flexibility, balance, cardiorespiratory fitness, and weight management through effective fat oxidation (Chavarrias et al., 2019; Polo-Recuero et al., 2023; Exercise Bike Editorial Team, 2024). Ratajczak et al. (2020) further demonstrated that 12 weeks of indoor cycling significantly improved metabolic function and reduced cardiometabolic risk factors, particularly dyslipidaemia, among overweight and obese individuals.

Physical exercise, including ergonomic biking, is therefore considered a primary therapeutic approach for individuals with obesity and metabolic syndrome to reduce cardiovascular risk (Chavarrias et al., 2019). The antihypertensive benefits of indoor cycling appear to be enhanced with longer exercise duration and appropriate intensity, with studies reporting significant reductions in both systolic and diastolic blood pressure (Tsai et al., 2015; Verrusio et al., 2016; Niebauer et al., 2020; de Barcelos et al., 2022). Similarly, Kaya et al. (2018) observed that six weeks of indoor spinning exercise resulted in significant weight loss, body fat reduction, and improvements in body mass index among obese women. Based on this evidence, the present study was conducted to examine the effects of a six-week stationary ergonomic bike exercise programme on selected physiological parameters among obese university students.

Statement of the Problem

Exercise is widely recognised as an effective therapeutic and preventive intervention for both healthy individuals and clinical populations with diverse health conditions. Regular and sustained engagement in exercise has been shown to significantly enhance muscular strength, flexibility, balance, and cardiorespiratory fitness, irrespective of age, gender, or health status. Despite these well-established benefits, observations suggest that many university students, including those at Ignatius Ajuru University of Education, may have limited awareness of the health advantages associated with regular exercise participation, which may partly explain their low levels of engagement in structured physical activity.

The benefits of regular exercise are extensive and include improvements in cardiorespiratory fitness, development and maintenance of strong bones and muscles, effective weight management, reduction in symptoms of anxiety and depression, and prevention of cardiovascular diseases and certain cancers.

Nevertheless, university students are frequently observed to engage in prolonged sedentary behaviours that predispose them to adverse health outcomes, particularly obesity. Such behaviours include spending approximately 30–50 hours per week seated during lecture periods, with sedentary time increasing progressively from the first year to the final year of study. In addition, leisure time is commonly characterised by prolonged sitting or reclining while engaging in social interactions or using digital and social media platforms.

The negative health consequences associated with physical inactivity among students may be mitigated through deliberate participation in structured exercise modalities, such as stationary ergonomic bike exercise. However, there remains a paucity of empirical evidence regarding the effects of regular exercise participation using stationary ergonomic bikes, particularly among university student populations. Based on this gap in the literature, the present study was designed to investigate the effects of a six-week stationary ergonomic bike exercise programme on selected physiological parameters among obese students at Ignatius Ajuru University of Education, Port Harcourt, Rivers State..

Purpose of the Study

The purpose of this study was to investigate the effects of six-weeks exercise programme on certain physiologic parameters among overweight and obese undergraduate students in Ignatius Ajuru University of Education, Port Harcourt. Specifically, the study sought to achieve the following objectives;

1. determine the effect of six-weeks exercise programme on body mass index among overweight and obese undergraduate students in Ignatius Ajuru University of Education.
2. assess the effect of six-weeks exercise programme on thigh circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education.
3. evaluate the effect of six-weeks exercise programme on abdominal circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education.
4. Determine the effect of six-weeks exercise programme on hip circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education.
5. Ascertain the effect of six-weeks exercise programme on waist circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education.

Research Questions

The following research questions guided the study;

1. What is the effect of six-weeks exercise programme on body mass index among overweight and obese undergraduate students in Ignatius Ajuru University of Education?
2. What is the effect of six-weeks exercise programme on thigh circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education?
3. What is the effect of six-weeks exercise programme on abdominal circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education?
4. What is the effect of six-weeks exercise programme on hip circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education?
5. What is the effect of six-weeks exercise programme on waist circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education?

Hypotheses

The following hypotheses guided the study and was tested at 0.05 level of significance.

1. Six-weeks exercise programme has no significant effect on body mass index among overweight and obese undergraduate students of Ignatius Ajuru University of Education.
2. Six-weeks exercise programme has no significant effect on thigh circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education.

3. Six-weeks exercise programme has no significant effect on abdominal circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education.
4. Six-weeks exercise programme has no significant effect on hip circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education.
5. Six-weeks exercise programme has no significant effect on waist circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education.

Methodology

This study adopted a quasi-experimental research design. This study was conducted in Ignatius Ajuru University of Education, (IAUE). Ignatius Ajuru University of Education, was previously known as Rivers State College of Education. Ignatius Ajuru University of Education became the second state-owned University. The population of the study comprised of all undergraduate students of Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, Rivers State. The estimated population of the students is 20,484. A sample size of 61 students was used for the study. Using the convenience sampling approach, students were recruited via one-on-one contact and social media platforms. Adequate explanation was given to the respondents and they were assured of absolute confidentiality of their measured medical records before commencing the exercise programme. Each session of exercise included 10-minutes warm-up, 20-minutes exercise session on the ergonomic bike and 10-minutes cool-down. The exercise sessions were done twice in a week for 6 weeks. Height was measured with a stadiometer, weight was measured with an electronic scale. Five circumferences i.e. calf (CC), mid upper arm (MUAC), chest (CCN), waist (WC) and hip (HC) were measured by measuring tape. Three skinfolds i.e. calf (CSK), biceps (BSK), triceps (TSK), sub-scapular (SBSK) and supra-iliac (SISK) were measured (0.1 mm) on the left side of the body by skinfold calliper. Measurements were recorded for each participant. During the 6-week period, participants were asked not to change their dietary habits, their exercise habits and to maintain normal activity. The data collected were systemically coded and analysed with the aid of Statistical Product for Service Solution (SPSS) version 26. The research questions were analysed using descriptive statistical tools such as frequencies, percentages, mean and standard deviation; while the hypotheses were tested using inferential statistical tools like independent t-test at ≤ 0.05 alpha level of significance.

Results

Research Question 1: What is the effect of six-weeks exercise programme on body mass index among overweight and obese undergraduate students of Ignatius Ajuru University of Education?

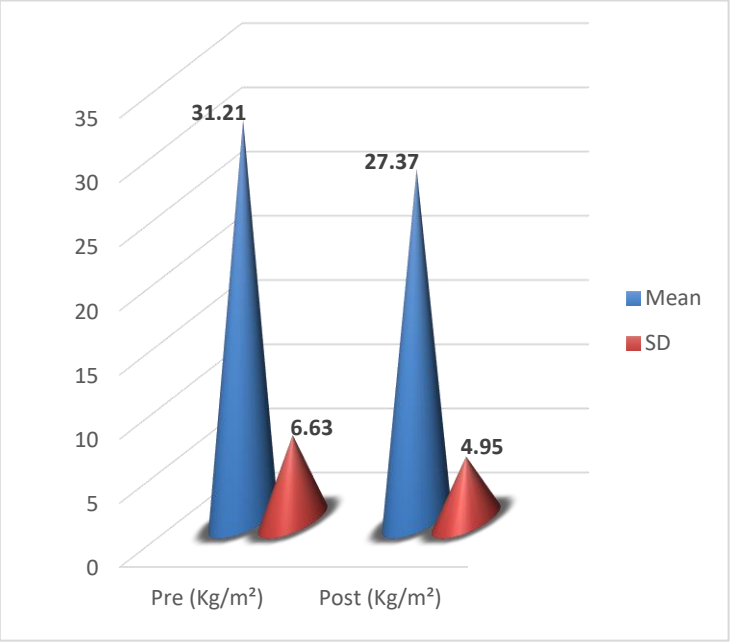

Figure 1: Effect of six-weeks exercise programme on BMI among overweight and obese undergraduate students

Figure 1 presented the summary of descriptive analysis on effect of six-weeks exercise programme on body mass index among overweight and obese undergraduate students in Ignatius Ajuru University of Education Rumuolumeni, Port Harcourt, Rivers State. The result showed the mean body mass index prior to six-weeks exercise intervention was 31.21±6.63kg/m^2; while the post intervention mean body mass index was 27.37±4.95kg/m^2 among overweight and obese undergraduate students.

Research Question 2: What is the effect of six-weeks exercise programme on thigh circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education?

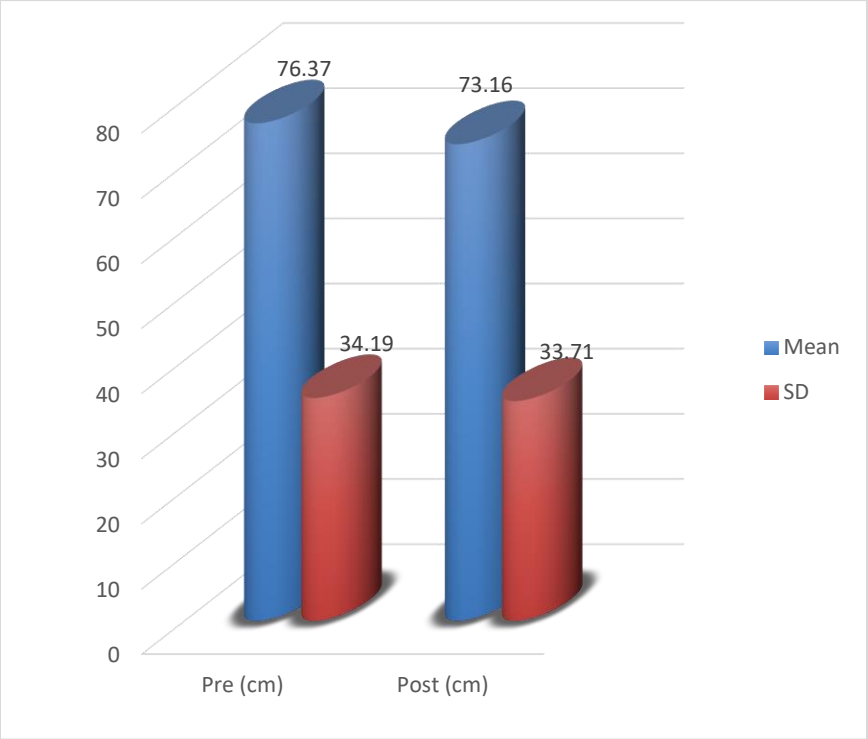

Figure 2: Effect of six-weeks exercise programme on thigh fat among overweight and obese undergraduate students

Figure 2 presented the results on effect of six-weeks exercise programme on thigh circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education Rumuolumeni, Port Harcourt, Rivers State. The result showed the mean thigh circumference was 76.37±34.19cm prior to the exercise intervention; the mean thigh circumference was observed to be 73.16±33.71cm post six-weeks exercise intervention.

Research Question 3: What is the effect of six-weeks exercise programme on abdominal circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education?

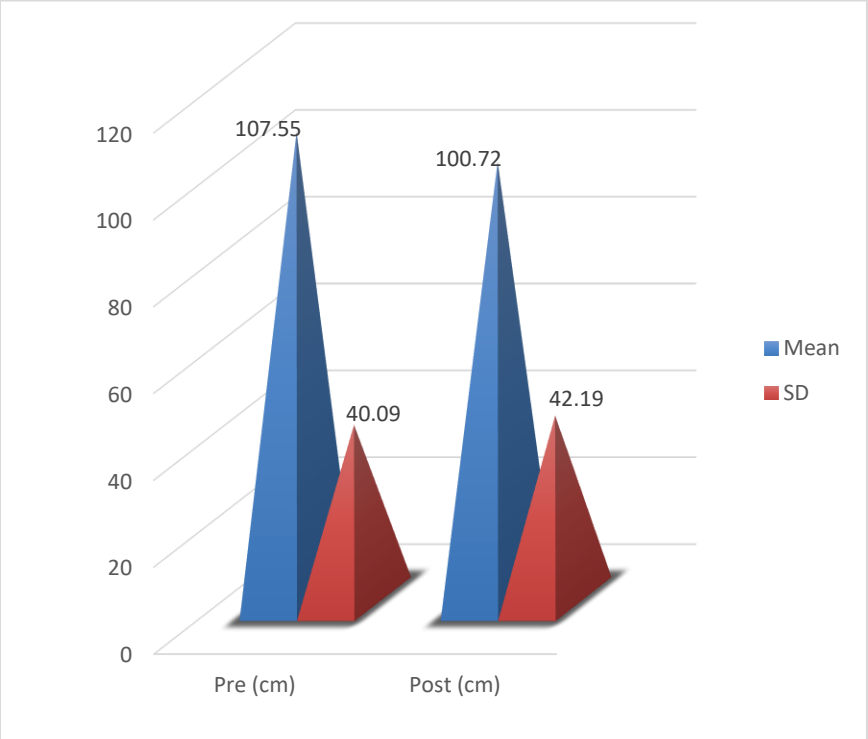

Figure 3: Effect of six-weeks exercise programme on abdominal circumference among overweight and obese undergraduate students

Figure 3 presents the result on effect of six-weeks exercise programme on abdominal circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education. The result showed the mean abdominal circumference was 107.55 ±40.09cm prior to the exercise intervention among the undergraduate students; the mean abdominal circumference of 100.72±42.19cm was observed after the six weeks exercise intervention.

Research Question 4: What is the effect of six-weeks exercise programme on hip circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education?

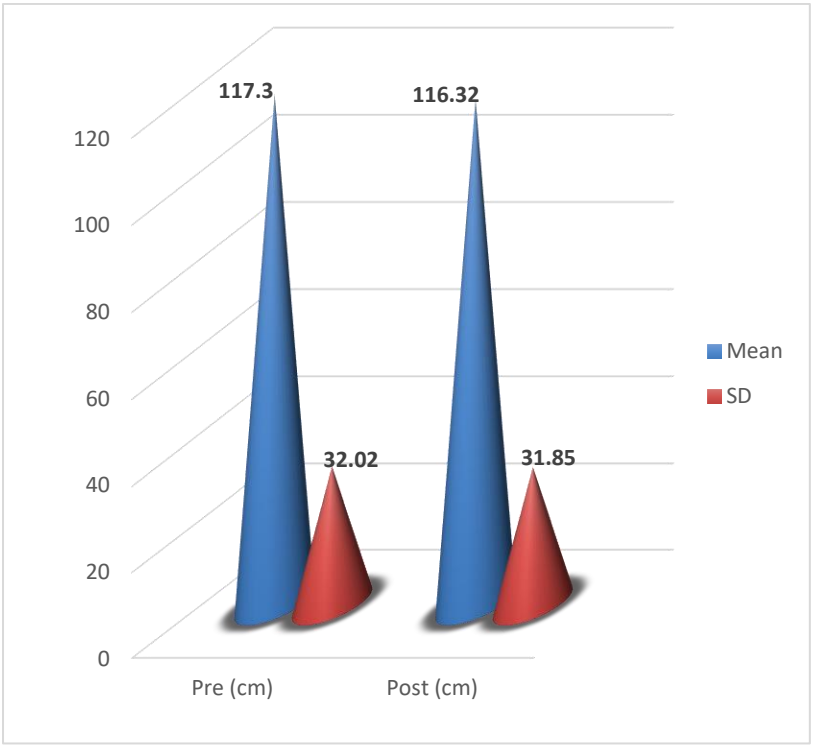

Figure 4: Effect of six-weeks exercise programme on hip circumference among overweight and obese undergraduate students

Figure 4 presented the result on effect of six-weeks exercise programme on hip circumference among overweight and obese undergraduate students of Ignatius Ajuru University of Education, Port Harcourt, Rivers State. The result showed that prior to exercise intervention, the mean hip circumference was 117.30±30.02cm; while mean hip circumference of 116.32±31.85cm was obtained post exercise intervention.

Research Question 5: What is the effect of six-weeks exercise programme on waist circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education?

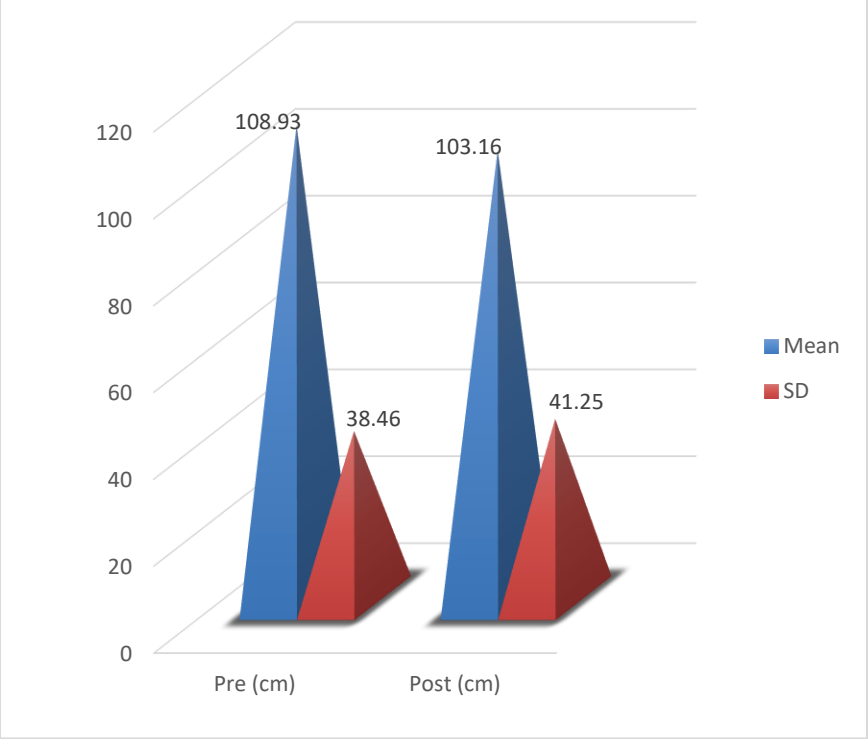

Figure 5: Effect of six-weeks exercise programme on waist circumference among overweight and obese undergraduate students

Figure 5 presented the result on effect of six-weeks exercise programme on waist circumference among overweight and obese undergraduate students of Ignatius Ajuru University of Education, Port Harcourt, Rivers State. The mean waist circumference was 108.93±38.46cm prior to exercise intervention; and a mean waist circumference of 103.16±41.25cm was obtained post exercise intervention among the undergraduate students.

Test of Hypotheses

Hypothesis 1: Six-weeks exercise programme has no significant effect on Body Mass Index among overweight and obese undergraduate students in Ignatius Ajuru University of Education.

Table 1: Paired samples t-test on effect of 6-weeks exercise programme on body mass index among overweight and obese undergraduate students

BMI (Kg/m^2)	N	Mean	Std Dev.	Df	t-value	p-value	Decision
Post 6-weeks exercise programme	62	27.3712	4.95187	61	-11.282	0.000	Significant
Pre 6-weeks exercise programme	62	31.2047	6.62765				

Table 1 presented the summary of Paired Samples t-test on effect of 6-weeks exercise programme on body mass among overweight and obese undergraduate students of Ignatius Ajuru University of Education, Port Harcourt, Rivers State. The result showed that six weeks exercise programme has significant effect (t= -11.282; p= 0.000) on body mass among overweight and obese undergraduate

students of Ignatius Ajuru University of Education, Port Harcourt, Rivers State. Therefore, the null hypothesis was rejected at 0.05 alpha level of significance.

Hypothesis 2: Six-weeks exercise programme has no significant effect on thigh circumference among obese undergraduate students in Ignatius Ajuru University of Education.

Table 2: Paired samples t-test on effect of 6-weeks exercise programme on thigh circumference among overweight and obese undergraduate students

Thigh fat	N	Mean	Std Dev.	Df	t-value	p-value	Decision
Post 6-weeks exercise participation	62	73.1513	33.71366	61	-5.795	0.000	Significant
Pre 6-weeks exercise participation	62	76.3723	34.18550				

Table 2 presented the summary of Paired Samples t-test on effect of 6-weeks exercise programme on thigh circumference among overweight and obese undergraduate students of Ignatius Ajuru University of Education, Port Harcourt, Rivers State. The result showed that six weeks exercise intervention has significant effect (t= -5.795; p= 0.000) on thigh circumference among overweight and obese undergraduate students of Ignatius Ajuru University of Education. Therefore, the null hypothesis was rejected at 0.05 alpha level of significance.

Hypothesis 3: Six-weeks exercise programme has no significant effect on abdominal circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education.

Table 3: Paired samples t-test on effect of 6-weeks exercise programme on abdominal circumference among overweight and obese undergraduate students

Abdominal fat	N	Mean	Std Dev.	Df	t-value	p-value	Decision
Post 6-weeks exercise programme	62	100.7187	42.18980	61	-4.951	0.000	Significant
Pre 6-weeks exercise programme	62	107.5471	40.08896				

Table 3 presented the summary Paired Samples t-test on effect of 6-weeks exercise programme on abdominal circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, Rivers State. The result showed that six-weeks exercise intervention has significant effect (t= -4.951; p= 0.000) on abdominal circumference among overweight and obese undergraduate students of Ignatius Ajuru University of Education. Therefore, the null hypothesis was rejected at 0.05 alpha level of significance.

Hypothesis 4: Six-weeks exercise programme has no significant effect on hip circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education.

Table 4: Paired samples t-test on effect of 6-weeks exercise programme on hip circumference among overweight and obese undergraduate students

Hip fat	N	Mean	Std Dev.	Df	t-value	p-value	Decision
Post 6-weeks exercise programme	62	116.3265	31.84698	61	-4.606	0.000	Significant
Pre 6-weeks exercise programme	62	117.3019	32.02134				

Table 4 presented the summary Paired Samples t-test on effect of 6-weeks exercise programme on hip circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, Rivers State. The result showed that six-weeks exercise intervention has significant effect (t= -4.606; p= 0.000) on hip circumference among overweight and obese undergraduate students of Ignatius Ajuru University of Education. Therefore, the null hypothesis was rejected at 0.05 alpha level of significance.

Hypothesis 5: Six-weeks exercise programme has no significant effect on waist circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education

Table 5: Paired samples t-test on effect of 6-weeks exercise programme on waist circumference among overweight and obese undergraduate students

Waist fat	N	Mean	Std Dev.	Df	t-value	p-value	Decision
Post 6-weeks exercise programme	62	103.1574	41.24881	61	-2.960	0.004	Significant
Pre 6-weeks exercise programme	62	108.9290	38.45779				

Table 5 presented the summary Paired Samples t-test on effect of 6-weeks exercise programme on waist circumference among overweight and obese undergraduate students in Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, Rivers State. The result showed that six-weeks exercise intervention has significant effect (t= -2.960; p= 0.004) on waist circumference among overweight and obese undergraduate students of Ignatius Ajuru University of Education. Therefore, the null hypothesis was rejected at 0.05 alpha level of significance.

Discussion of Findings

Excesses adiposity as demonstrated by high prevalence of overweight and obesity especially among undergraduate students is a reflection of poor active lifestyle predicated by sedentarism due to prolonged lecture hours and academic pressure (Arisa et al., 2020; Telleria-Aramburu & Arroyo-Izaga, 2022; Ilić et al., 2022; Oluwasanu et al., 2023). Interestingly, studies have shown the effects of poor active lifestyle could be mitigated and remedied through the introduction of ergonomic bike and engagement in ergonomic bike exercise in campus (Ding et al., 2023; Polo-Recuero et al., 2023). This study investigated the effects of six-weeks ergonomic bike exercise on certain physiologic parameters among overweight and obese undergraduate students in Ignatius Ajuru University of Education, Port Harcourt, Rivers State.

Findings on Figure 1 revealed the mean body mass index was 31.2131.21±6.63kg/m^2 among overweight and obese students prior to six-weeks exercise intervention; while the post intervention mean body mass index was 27.37±4.95kg/m^2. In addition, the tested hypothesis revealed that six-weeks exercise programme is 11.28 times (t= -11.282; p= 0.000) more likely to reduce the body mass index among overweight and obese undergraduate students of Ignatius Ajuru University of Education. The study aligned with Ding et al., (2023) who reported that students who engaged cycling maintained healthier weight when compared to their counterpart that do not engage in cycling. Similarly, Kaya et al., (2018) posited that cycling workouts is an effective method to lose weight and recommended getting ergonomic for obese and overweight individuals for effective weight management.

Findings on Figure 2 revealed the mean thigh circumference was 76.37±34.19cm among overweight and obese students prior to six-weeks exercise intervention; the post intervention mean thigh circumference was observed to be 73.16±33.71cm. Similarly, the paired samples t-test analysis revealed that six-weeks exercise programme is 5.79 times (t= -5.795; p= 0.000) more likely to reduce thigh circumference among overweight and obese undergraduate students of Ignatius Ajuru University of Education. The finding consonant with Chavarrias et al., (2019) who posited that regular indoor cycling engagement would not only aerobic capacity but also enhanced the body lipid profiles. Konstantynowicz et al., (2011) and Hodgkiss and McCarthy, (2017) averred that thigh circumference appeared the most specific and sensitive anthropometric predictor of fatness between overweight and healthy normal weight females. Also, Ratajczak et al., (2020) and Wheeler (2023) asserted that indoor cycling programmes do help in shedding fats, promote healthy heart, and boost muscle endurance, while burning off the harmful low-density lipoprotein cholesterol and improving the high-density lipoprotein cholesterols. Reeves (2024) asserted that the quantity of thigh fats burned when engaging on ergonomic bike exercise depends on the intensity of the exercise routine; stressing that regular ergonomic bike exercise of 150minutes spread throughout a week could sufficiently reduce thigh fats and slim-down the thigh muscles over a period.

Findings on Figure 3 revealed the mean abdominal circumference among overweight and obese

undergraduate students was 107.55±40.09cm prior to six-weeks exercise intervention; while the post intervention abdominal circumference mean was 100.72±42.19cm. In addition, the tested hypothesis revealed that six-weeks exercise programme is 4.95 times (t= -4.951; p= 0.000) more likely to reduce abdominal fats among overweight and obese undergraduate students of Ignatius Ajuru University of Education. This implied that engagement in six-weeks exercise programme could significantly reduce abdominal fats in overweight and obese individuals. Previous study by Kabir et al., (2023) reported the prevalent rate of abdominal overweight and obesity was 42% among undergraduate students, and this prevalence was linked to high consumption of energy and carbohydrate beverages and foods. Arisa et al., (2020) and Telleria-Aramburu observed apart from prolong lecture hours, poor eating habits among overweight and obese undergraduate students as majority engaged in snacking and fast-food consumption. The finding agreed with Russomando et al., (2020) who reported that high intensity ergonomic cycle training reduce abdominal fats as demonstrated by reduction in abdominal circumference among overweight subjects. Dhanorkar and Uttekar (2024) reported that regular cycling which is moderate-intensity aerobic exercise could effectively lower abdominal fat, enhance overall fat loss and promote a healthy weight. Tardif-Francoeur (2023) posited that while cycling, the abdominal muscles are activated to keep stable as your pedal; and these muscles contract throughout cycling workout which improves overall abdominal strength. Thus, the combination of fat and weight loss with strengthened abdominals would lead to a toned look in midsection.

Findings on Figure 4 showed the mean hip circumference was 117.30±30.02cm among overweight and obese students prior to six-weeks exercise intervention. The post intervention mean hip circumference was observed to be 116.32±31.85cm after six-weeks of exercise programme. In addition, the tested hypothesis revealed that six-weeks exercise programme is 4.60 times (t= -4.606; p= 0.000) more likely to reduce hip fats among overweight and obese undergraduate students of Ignatius Ajuru University of Education. This implied that engagement in six-weeks exercise programme could significantly reduce hip fats among overweight and obese individuals. The finding agreed with Raj et al., (2024) who reported significant reduction in hip circumference after the therapeutic use of aerobic exercise among adolescence with obesity. Similar study by Ratajczak et al., (2020) also reported significant reduction in hip circumference after 3-months of indoor cycling programme which was observed to have also triggered several biochemical processes that promotes overall cardiovascular health and efficient weight management (Chavarrias et al., 2019; Ratajczak et al., 2020).

Findings on Figure 5 revealed the mean waist circumference was 108.93±38.46cm among overweight and obese students prior to six-weeks exercise intervention; while the post intervention mean waist circumference was 103.16±41.25cm. The tested hypothesis also showed that six-weeks exercise intervention is 2.96 times (t= -2.960; p= 0.004) more likely to reduce waist fat among overweight and obese undergraduate students of Ignatius Ajuru University of Education. The finding concurred with Ratajczak et al., (2020) when they reported a significant reduction in waist circumference after 3-months of indoor cycling programme among obese women. Similar result was observed by Raj et al., (2024) who reported significant reduction in waist circumference after therapeutic aerobic exercise intervention among adolescents with obesity. The efficacy of six-weeks exercise programme was further attested to by Kim et al., (2015) when they reported a significant reduction in waist circumference among people with spinal cord injuries after they participated in a six-weeks indoor hand-bike exercise on health and fitness programme.

Conclusion

Based on the findings of the study, it was concluded that six-weeks ergonomic bike exercise intervention has significant effects on body mass index, thigh circumference, abdominal circumference, hip circumference, and waist circumference among overweight and obese undergraduate students of Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, Rivers State.

Recommendations

The following recommendations were made based on the major findings of this study;

1. The university management should provide ergonomic bicycle in the campus and at the same time grant the students unlimited access to these fitness facilities.

2. Students should be encouraged to prioritise physical exercise while university management provide needed opportunities for students to incorporate ergonomic bike exercise into their daily routines for proper weight management and promotion of healthy living.
3. Policy makers should propose and implement time-efficient initiatives that do not overwhelm students' academic busy schedules, and encourage participation is routine exercise.

REFERENCES

1. Abbasifard, M., Bazmandegan, G., Ostadebrahimi, H., Amiri, M., & Kamiab, Z. (2013). General and central obesity prevalence in young adult: A study based on the Rafsanjan youth cohort study. *Scientific Reports, 13*, 17259. https://doi.org/10.1038/s41598-023-44579-5
2. Alkhateeb, S. A., Alkhameesi, N. A., Lamfon, G. N., Khawandanh, S. Z., Kurdi, L. K., Faran, M. Y., Khoja, A. A., Bukhari, L. M., Aljahdali, H. R., Ashour, N. A., Bagasi, H. T., Delli, R. A., Khoja, O. A., & Safdar, O. Y. (2019). Pattern of physical exercise practice among university students in the Kingdom of Saudi Arabia (before beginning and during college): A cross-sectional study. *BMC Public Health, 19*, 1716. https://doi.org/10.1186/s12889-019-8093-2
3. Al-Sabbah, H. (2020). Prevalence of overweight/obesity, anaemia and their associations among female university students in Dubai, United Arab Emirates: A cross-sectional study. *Journal of Nutritional Science, 9*, e26. https://doi.org/10.1017/jns.2020.23
4. Arisa, N., Anaemene, D., & Mekwunye, W. (2020). Assessment of overweight, obesity and the dietary habits of undergraduate students of Lagos State University. European Journal of Nutrition and Food Safety, 12(5), 25-34. https://doi.org/10.9734/EJNFS/2020/v12i530225
5. Ayogu, R. B., Ezeh, M. G., & Udenta, E. A. (2022). Epidemiological characteristics of different patterns of obesity among adults in rural communities of south-east Nigeria: A population-based cross-sectional study. *BMC Nutrition, 8*, 59. https://doi.org/10.1186/s40795-022-00552-5
6. Benzo, R. M., Gremaud, A. L., Jerome, M., & Carr, L. J. (2016). Learning to Stand: The Acceptability and Feasibility of Introducing Standing Desks into College Classrooms. *International Journal of Environmental Research and Public Health, 13*, 823. https://doi.org/10.3390/ijerph13080823
7. Borodulin, K. & Anderssen, S. (2023). Physical activity: Associations with health and summary of guidelines. *Food and Nutrition Research, 67*, 9719.
8. Brown, K., & Jones, A. (2019). The impact of socioeconomic status on diet quality and weight status among university students: A systematic review. *Journal of American College Health, 67*(5), 455-463. https://doi.org/10.1080/07448481.2019.1572830
9. Castro, O., Bennie, J., Vergeer, I., Bosselut, G., Biddle, S. J. H. (2020). How sedentary are university students? A systematic review and meta-analysis. *Prevention Science, 21*(3), 332-343. https://doi.org/10.1007/s11121-020-01093-8
10. Chavarrias, M., Carlos-Vivas, J., Collado-Mateo, D., & Pérez-Gómez, J. (2019). Health benefits of indoor cycling: A systematic review. *Medicina, 55*, 452. https://doi.org/10.3390/medicina55080452
11. Chikara, M. (2023). *What is an exercise bike? History, pros and cons*. https://www.jagranjosh.com/general-knowledge/what-is-an-exercise-bike-history-pros-and-cons-1683901609-1
12. Chooi, Y. C., Ding, C. & Magkos, F. (2019). The epidemiology of obesity. *Metabolism, 92*, 6-10. https://doi.org/10.1016/j.metabol.2018.09.005
13. de Barcelos, G. T., Heberle, I., Coneglian, J. C., Vieira, B. A., Delevatti, R. S., & Gerage, A. M. (2022). Effects of aerobic training progression on blood pressure in individuals with hypertension: A systematic review with meta-analysis and meta-regression. *Frontiers in Sports and Active Living, 4*, 719063. https://doi.org/10.3389/fspor.2022.719063
14. Deliens, T., Deforche, B., Bourdeaudhuij, I. D., & Clarys, P. (2015). Determinants of physical activity

and sedentary behaviour in university students: A qualitative study using focus group discussions. *BMC Public Health, 15*, 201. https://doi.org/10.1186/s12889-015-1553-4

15. Dhanorkar, A., & Uttekar, P. S. (2024). *Can You Lose Belly Fat by Cycling?* MedicineNet. https://www.medicinenet.com/can-you-lose-belly-fat-by-cycling/
16. Ding, P., Ding, C., & Feng, S. (2023). The health benefits of bicycling to school among adolescents in China: A propensity score matching study. *Frontiers in Public Health, 11,* 1049254. https://doi.org/10.3389/fpubh.2023.1049254
17. Exercise Bike Editorial Team, (2024). Ten benefits of exercise bike. https://www.exercisebike.net
18. Grabež, M., Grujic, V. R., Ahmetovic, N., and Novaković, B. (2018). Sodium content and the most important dietary sources of sodium in a sample of student population. *Journal of Hygienic Engineering and Design, 25*, 44-48.
19. Hodgkiss, A. M., & McCarthy, H. D. (2017). Thigh circumference measurement as a potential marker of leg skeletal muscle mass – cross sectional study in a U.S. population age 39–69 years. Proceedings of the Nutrition Society, 76(OCE1), E14. https://doi.org/10.1017/S0029665117000143
20. Ilić, M., Pang, H., Vlaški, T., Grujičić, M., & Novaković, B. (2024). Prevalence and associated factors of overweight and obesity among medical students from the Western Balkans (South-East Europe Region). *BMC Public Health, 24*, 29. https://doi.org/10.1186/s12889-023-17389-7
21. Jebeile, H., Kelly, A. S., O'Malley, G. & Baur, L. A. (2022). Obesity in children and adolescents: Epidemiology, causes, assessment, and management. *Lancet Diabetes Endocrinology, 10*, 351-365. https://doi.org/10.1016/S2213-8587(22)00047-X
22. Jerome, M., Janz, K. F., Baquero, B., & Carr, L. J. (2017). Introducing sit-stand desks increases classroom standing time among university students. *Preventive Medicine Reports, 8*, 232-237. https://doi.org/10.1016/j.pmedr.2017.10.019
23. Jiang, Y., Wang, J., Wu, S., Li, N., Wang, Y., Liu, J., Xu, X., He, Z., Cheng, Y., Zeng, X., Wang, B., Zhang, C., Zhao, M., Su, Z., Guo, B., Yang, W., & Zheng, R. (2019). Association between takeout food consumption and obesity among Chinese university students: A cross-sectional study. *International Journal of Environmental Research and Public Health, 16*(6), 1071. https://doi.org/10.3390/ijerph16061071
24. Joe, H. (2022). Aerobic exercise and obesity reduction in adolescents. *Journal of Health and Medical Research, 4*(2), 5-6. https://doi.org/10.37532/jhmr.2022.4(02).108
25. Joubert, L., Kilgas, M., Riley, A., Gautam, Y., Donath, L., Drum, S. (2017). In-class cycling to augment college student academic performance and reduce physical inactivity: Results from an RCT. *International Journal of Environmental Research and Public Health*, *14*, 1343. https://doi.org/10.3390/ijerph14111343
26. Kabir, H., Rahman, S. A., Kamruzzaman, M. (2023). General and abdominal obesity and dietary nutrient intake among university students in Bangladesh: A cross-sectional study targeting potential risk factors. *Clinical Nutrition ESPEN, 57*, 587-597. https://doi.org/10.1016/j.clnesp.2023.08.006
27. Karatrantou, K., & Gerodimos, V. A. (2024). Comprehensive workplace exercise intervention to reduce musculoskeletal pain and improve functional capacity in office workers: A randomized controlled study. *Healthcare*, 12, 915.
28. Kaya, F., Nar, D., & Erzeybek, M. S. (2018). Effect of spinning cycling training on body composition in women. *Journal of Education and Training Studies, 6*(4), 154-160. https://doi.org/10.11114/jets.v6i4.3028
29. Kim et al., (2015)
30. Kljajević, V., Stanković, M., Đordević, D., Trkulja-Petković, D., Jovanović, R., Plazibat, K., Oršolić, M., Curić, M., & Sporiš, G. (2022). Physical activity and physical fitness among university students: A systematic review. *International Journal of Environmental Research and Public Health, 19*, 158.

31. Kobayashi, E., Sato, Y., Umegaki, K, & Chiba, T. (2017). The prevalence of dietary supplement use among college students: A nationwide survey in Japan. *Nutrients, 9*(11), 1250. https://doi.org/10.3390/nu9111250

32. Konstantynowicz, J., Abramowicz, P., Jamiolkowski, J., Kadziela-Olech, H., Bialokoz-Kalinowska, I., Kierus-Jankowska, K., Piotrowska-Jastrzebska, J., & Kaczmarski, M. (2011). Thigh circumference as a useful predictor of body fat in adolescent girls with anorexia nervosa. *Annal of Nutrition and Metabolism, 58,* 181–187. https://doi.org/10.1159/000329437

33. Lynch, J., O'Donoghue, G., Peiris, C. L. (2022). Classroom movement breaks and physically active learning are feasible, reduce sedentary behaviour and fatigue, and may increase focus in university students: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health, 19*, 7775. https://doi.org/10.3390/ijerph19137775

34. Ma, X., Chen, Q., Pu, Y., Guo, M., Jiang, Z., Huang, W., Long, Y., & Xu, Y. (2020). Skipping breakfast is associated with overweight and obesity: A systematic review and meta-analysis. *Obesity Research and Clinical Practice, 14*, 1-8. https://doi.org/10.1016/j.orcp.2019.12.002

35. Mayfield, H., & Bobb, A. (2023). *Exercise definition and types*. Lifestyle Courses.

36. Moulin, M. S., & Irwin, J. D. (2017). An assessment of sedentary time among undergraduate students at a Canadian university. *International Journal of Exercise Science, 10*(8), 1116-1129. https://digitalcommons.wku.edu/ijes/vol10/iss8/3

37. Naigaga, D. A., Jahanlu, D., Claudius, H. M., Gierlaug, A. K., Barikmo, I., & Henjum, S. (2018). Body size perceptions and preferences favour overweight in adult Saharawi refugees. *Nutrition Journal, 17*(1), 17. https://doi.org/10.1186/s12937-018-0330-5

38. Niebauer, J., Müller, E. E., Schönfelder, M., Schwarzl, C., Mayr, B., Stöggl, J., Stöggl, T. (2020). Acute effects of winter sports and indoor cycling on arterial stiffness. *Journal of Sports Science and Medicine, 19*(3), 460-468.

39. Obirikorang, C., Adu, E. A., Anto, E. O., Awuah, A. A., Fynn, A. N. B., Osei-Somuah, G., Ansong, P. N., Boakye, A. O., Ofori-Boadu, I., Obirikorang, Y., Adobasom-Anane, A. G., Nyarko, E. N. Y., & Balmer, L. (2024). Prevalence and risk factors of obesity among undergraduate student population in Ghana: an evaluation study of body composition indices. BMC Public Health, 24, 877. https://doi.org/10.1186/s12889-023-17175-5

40. OECD (2014). *How many young people enter tertiary education?* Education at a Glance 2014 Highlights. OECD Publishing, Paris. https://doi.org/10.1787/eag_highlights-2014-9-en

41. OECD (2023), *Education at a Glance 2023 OECD Indicators.* OECD Publishing, Paris, https://doi.org/10.1787/e13bef63-en

42. Oluwasanu, A. O., Akinyemi, J. O., Oluwasanu, M. M., Oseghe, O. B., Oladoyinbo, O. L., Bello, J., Ajuwon, A. J., Jegede, A. S., Danaei, G., Akingbola, O. (2023). Temporal trends in overweight and obesity and chronic disease risks among adolescents and young adults: A ten-year review at a tertiary institution in Nigeria. *PLoS ONE 18*(4), e0283210. https://doi.org/10.1371/journal.pone.0283210

43. Pan, M., Ying, B., Lai, Y., & Kuan, G. (2022). Status and influencing factors of physical exercise among college students in China: A systematic review. *International Journal of Environmental Research and Public Health, 19,* 13465. https://doi.org/10.3390/ijerph192013465

44. Pati, S., Irfan, W., Jameel, A., Ahmed, S., & Shahid, R. K. (2023). Obesity and cancer: A current overview of epidemiology, pathogenesis, outcomes, and management. *Cancers, 15*, 485. https://doi.org/10.3390/cancers15020485

45. Polo-Recuero, B., Ordóñez-Dios, A., Rojo-Tirado, M. A., & Lorenzo, A. (2023). Do you want to increase physical activity in adolescents? A school-based physical activity programme could be an efficient way. *Children, 10*, 1641. https://doi.org/10.3390/children10101641

46. Raj, H. P., Subramanian, P., Nehru, M., Ayyavoo, S., Annamalai, N., & Prabhu, V. (2024).

Therapeutic impact of aerobic exercise on adolescents with obesity and its association with expression of miRNAs and cytokines: A clinical approach. *Medicina, 60*, 459. https://doi.org/10.3390/medicina60030459

47. Ratajczak, M., Skrypnik, D., Krutki, P., & Karolkiewicz, J. (2020). Effects of an indoor cycling program on cardiometabolic factors in women with obesity versus normal body weight. *International Journal of Environmental Research and Public Health, 17*, 8718. https://doi.org/10.3390/ijerph17238718
48. Reeves, C. (2024). *How to cycle to slim your inner thighs: Cycling for exercise*. Melbourne Bike Share. https://melbournebikeshare.com.au/category/cycling-for-exercise/
49. Russomando, L., Bono, V., Mancini, A., Terracciano, A., Cozzolino, F., Imperlini, E., Orrù, S., Alfieri, A., & Buono, P. (2020). The effects of short-term high-intensity interval training and moderate intensity continuous training on body fat percentage, abdominal circumference, BMI and vo2max in overweight subjects. *Journal of Functional Morphology and Kinesiology, 5*, 41. https://doi,org/10.3390/jfmk5020041
50. Santos, L. R., de Araujo, S. S., Vieira, E. F. S., Estevam, C. S., dos Santos, J. L., Wichi, R. B., Lima, F. B., Carvalho, C. R. O., Aidar, F. J., & Marçal, A. C. (2020). Effects of 12 Weeks of Resistance Training on Cardiovascular Risk Factors in School Adolescents. *Medicina, 56*, 220. https://doi.org/10.3390/medicina56050220
51. Sortino, M., Trovato, B., Zanghì, M., Roggio, F., & Musumeci, G. (2024). Active breaks reduce back overload during prolonged sitting: Ergonomic analysis with infrared thermography. *Journal of Clinical Medicine, 13*, 3178. https://doi.org/10.3390/jcm13113178
52. Tardif-Francoeur, J. (2023). *How effective is stationary biking, really?* LinkedIn. https://www.linkedin.com/in/justin-tardif-francoeur-016b33238/
53. Telleria-Aramburu, N., & Arroyo-Izaga, M. (2022). Risk factors of overweight/obesity-related lifestyles in university students: Results from the EHU12/24 study. *British Journal of Nutrition, 127*, 914-926. https://doi.org/10.1017/S0007114521001483
54. Tsai, S. W., Chan, Y. C., Liang, F., Hsu, C. Y., Lee, I. T. (2015). Brain-derived neurotrophic factor correlated with muscle strength in subjects undergoing stationary bicycle exercise training. *Journal of Diabetes and its Complications, 29*(3), 367-371, https://doi.org/10.1016/j.jdiacomp.2015.01.014
55. Ukegbu, P. O., Uwaegbute, A. C., Echendu, C. A., Ejike, C., Anyika-Elekeh, J. U., Asumugha, V. U., Kuyik, S. A., Omodamiro, S., Nwofia, B., Uzokwe, C., Oluchi-Nliam, C., & Uwakwe, N. (2017). Obesity and associated factors in young adults attending tertiary institutions in south-eastern Nigeria. *South African Journal of Clinical Nutrition, 30*(2), 43-48. http://dx.doi.org/10.1080/16070658.2016.1259032
56. Verrusio, W., Andreozzi, P., Renzi, A., Martinez, A., Longo, G., Musumeci, M., Cacciafesta, M. (2016). Efficacy and safety of spinning exercise in middle-aged and older adults with metabolic syndrome: Randomized control trial. *Annali dell'lstituto Superiore di Sanita, 52*(2), 295-300. https://doi.org/10.4415/ANN_16_02_24
57. Vucenik, I., & Stains, J. P. (2012). Obesity and cancer risk: evidence, mechanisms, and recommendations. *Annals of the New York Academy of Sciences, 1271*, 37-43. https://doi.org/10.1111/j.1749-6632.2012.06750.x
58. Wheeler, T. (2023). *Indoor cycling: How it works*. Health and Fitness Guide, WebMD. https://www.webmd.com/fitness-exercise/default.htm
59. WHO (2020). *Obesity and overweight*. World Health Organization fact sheet on obesity and overweight.https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight
60. WHO, (2022). *Physical activity*. World Health Organisation fact sheets. https://www.who.int/news-room/fact-sheets/detail/physical-activity

61. WHO, (2024). *Obesity and overweight: Fact sheets.* https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight