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Original Article

INVESTIGATING PHYSICAL FITNESS OF STUDENTS: A MULTI-DIMENSIONAL ANALYSIS OF HEALTH-RELATED FITNESS TEST METRICS

INVESTIGANDO A APTIDÃO FÍSICA DE ESTUDANTES: UMA ANÁLISE MULTIDIMENSIONAL DE MÉTRICAS DE TESTE DE APTIDÃO RELACIONADOS À SAÚDE

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RESUMO

Este estudo teve como objetivo examinar o estado atual das avaliações da aptidão física relacionada com a saúde em programas de educação física. Este estudo foi realizado com o objetivo geral de realizar uma análise abrangente do panorama atual relativo às avaliações da aptidão física relacionada com a saúde nos programas de educação física. Este estudo utilizou o desenho de investigação quase-experimental. O procedimento de investigação descrito abrange uma avaliação abrangente dos parâmetros de aptidão física relacionados com a saúde durante um período de 22 semanas. A abordagem estruturada envolve a realização de testes específicos em dias designados, alternando entre inquiridos do sexo masculino e feminino. As pré-avaliações abrangem aspetos relacionados com a saúde, como a resistência cardiovascular, a força e resistência muscular, a flexibilidade e a composição corporal. Este arranjo sistemático permite um exame detalhado de várias facetas da aptidão e potenciais diferenças de desempenho baseadas no género. Ao realizar avaliações ao longo de várias semanas e ao garantir uma distribuição equilibrada dos testes, os investigadores podem recolher dados robustos e, ao mesmo tempo, minimizar o impacto de potenciais variáveis de confusão. Os dados apresentados exploram as correlações entre várias métricas fisiológicas e de desempenho pós-exercício entre uma amostra de 50 participantes. A idade apresenta uma notável correlação positiva com o desempenho na primeira tentativa ($r = 0{,}336$, $p < 0{,}05$) e na segunda tentativa ($r = 0{,}296$, $p < 0{,}05$), indicando que os participantes mais velhos tendem a ter um melhor desempenho nestas tentativas. Os dados sublinham as complexas inter-relações entre factores demográficos, composição corporal, respostas fisiológicas e avaliações de desempenho. O estudo revelou que os participantes do sexo masculino exibiram medidas de altura significativamente mais elevadas em comparação com as mulheres. Além disso, foi observada uma correlação negativa entre a altura média e o Índice de Massa Corporal, indicando que os indivíduos mais elevados tendem a apresentar valores de IMC mais baixos na população amostrada. O estudo identificou uma forte relação positiva entre a força muscular e a resistência. No entanto, foram observadas inconsistências nas medições da frequência cardíaca durante a avaliação destas variáveis. As associações entre a frequência cardíaca pré-exercício e a frequência cardíaca pós-exercício, e as correlações significativas da força muscular e da resistência são bons exemplos para mostrar as ligações entre as diferentes medidas de desempenho físico.

Palavras-chave: relacionado à saúde; aptidão física; bem-estar; esportes; atividade física.

ABSTRACT

This study aimed to examine the current state of health-related fitness assessments in physical education programs. This study was undertaken with the overarching objective of conducting a comprehensive analysis of the present landscape pertaining to health-related fitness assessments within physical education programs. This study made use of the Quasi-experimental research design. The research procedure outlined encompasses a comprehensive assessment of health-related fitness parameters over a 22-week period. The structured approach involves conducting specific tests on designated days, alternating between male and female respondents. The pre-assessments cover health-related aspects like cardiovascular endurance, muscular strength and endurance, flexibility, and body composition. This systematic arrangement allows for a detailed examination of various facets of fitness and potential gender-based differences in performance. By conducting assessments over multiple weeks and ensuring a balanced distribution of tests, researchers can gather robust data while minimizing the impact of potential confounding variables. The presented data explores the correlations between various post-exercise physiological and performance metrics among a sample of 50 participants. Age shows a notable positive correlation with the first attempt performance ($r = 0.336$, $p < 0.05$) and second attempt performance ($r = 0.296$, $p < 0.05$), indicating older participants tend to perform better on these attempts. The data underscore the complex interrelationships between demographic factors, body composition, physiological responses, and performance assessments. The study revealed that male participants exhibited significantly greater height measurements compared to females. Additionally, a negative correlation was observed between average height and Body Mass Index, indicating that taller individuals tended to have lower BMI values within the sampled population. The study identified a strong positive relationship between muscular strength and endurance. However, inconsistencies were observed in heart-rate measurements during the assessment of these variables. The associations between pre-exercise heart rate and post-exercise

heart rate, and the significant correlations of muscular strength, endurance are good examples to show the links between the different physical performance measures.
Keywords: health- related; physical fitness; well-being; sports; physical activity.

Introduction

The objective of education is to foster holistic development in students by enhancing their mental and physical growth within the school environment. Mental development is facilitated through academic pursuits, while physical development is nurtured through participation in physical fitness and sports activities. The integration of physical fitness assessments is a common strategy within physical education (PE) programs in many countries. Educators in physical education strongly believe that fitness tests are crucial in encouraging students to focus on their health and participate in regular physical activity[1]. Physical education (PE) is considered as the most appropriate means for encouraging active and healthy lifestyles among young individuals[2].

The requirement for physical fitness testing in public schools was established by the Ministry of Education, Culture, and Sports via DepEd Order No. 53, issued in 1985. The creation of the physical fitness test was a joint effort started by the Task Force on School Sports (TFSS) and later reviewed by the Bureau of Secondary Education (BSE), resulting in the Physical Fitness Test Manual. This manual is intended for both public and private schools to use in their Physical Education School Programs. Physical fitness testing plays a crucial role in the lives of students. Within the educational system, it serves as a valuable tool for assessing the attainment of learning standards associated with physical education[3]. These standards encompass a range of competencies, including demonstrating proficiency in various motor skills and movement patterns, applying understanding of concepts, principles, strategies, and tactics related to movement and performance, achieving and maintaining a health-promoting level of physical activity and fitness, exhibiting responsible personal and social behavior that respects oneself and others, and recognizing the value of physical activity for health, enjoyment, challenge, self-expression, and social interaction. These standards are established based on the outcomes of field physical tests[4].

Maintaining physical health equips individuals to face life's challenges effectively. Therefore, the implementation of fitness tests in schools is crucial to encourage children to engage in physical activity not only today but also throughout their lives. Physical fitness assessments fall into two primary categories: health-related and skill-related. Health-related assessments evaluate body composition, cardiovascular endurance, strength, and flexibility[5]. Meanwhile, skill-related assessments focus on measuring coordination, agility, speed, power, balance, and reaction time. Health-related physical fitness tests play a pivotal role in predicting a student's future health risk. On the other hand, skill-related fitness tests are instrumental in identifying athletic talents, strengths, and weaknesses. This information aids in the selection of athletes for competitive events. The parameters of skill-related fitness tests include coordination, agility, speed, power, balance, and reaction time, all of which are essential for effective athlete selection and development[6].

In summary, physical fitness tests, encompassing both health-related and skill-related components, are vital for assessing student fitness levels, identifying strengths and areas for improvement, guiding physical activities, collecting and analysing data, establishing norms and standards, and motivating students to select suitable sports activities.

Health-related Physical Fitness

Health-related physical fitness concerns the development of qualities that often provide protection against illness and are frequently linked with physical activity. Therefore, health-related physical fitness is significant for everyone and should be emphasized by physical educators. Rising healthcare expenses and the recognition of the benefits associated with participating in health and fitness activities have led many educational institutions, businesses, and other organizations to establish programs for their students and clients. They have discovered that such initiatives promote good health and also make economic sense, as poor health incurs costs in terms of sickness, premature mortality, reduced productivity, and absenteeism[7].

Components of Health-related Physical Fitness

Cardiovascular Endurance

Cardiovascular Endurance refers to the capacity of the body's circulatory and respiratory systems to provide the necessary fuel during continuous physical activity[8]. To enhance your cardiovascular endurance, consider engaging in activities that maintain a safe, elevated heart rate for an extended period, such as walking, swimming, or bicycling. It is important to note that the chosen activity does not need to be highly strenuous to improve cardiovascular endurance. Begin gradually with an activity you find enjoyable, and progressively increase the intensity.

This aspect of fitness can be defined as the body's ability to deliver oxygen and nutrients to all its vital organs for sustaining prolonged, rhythmic exercise[9].

Muscular Strength

Muscular Strength denotes the ability of your muscles to produce force and power during particular activities. Enhancing muscle strength not only boosts general well-being but also aids in performing daily activities and tasks more effortlessly. Moreover, it reduces the risk of injury while participating in favorite sports and activities. Conversely, muscular endurance pertains to the capability of sustaining tasks, whether consistent or varied, over an extended period[10].

Muscular Endurance

Muscular Endurance is closely linked to muscular strength because you need strength to perform a skill for multiple repetitions. As you continue to build your endurance, you'll be able to remain active and engaged for more extended periods, enhancing your performance in various activities[10].

Flexibility

Flexibility involves the ability to move your body and joints through their full range of motion. Having good flexibility allows you to stretch and elongate your muscles before and after physical activities, which helps prevent muscle strains or injuries. Participating in activities like regular yoga or daily stretching can help keep your body feeling flexible and comfortable throughout the day[10].

Body Composition

Body composition refers to evaluating body fat compared to lean muscle mass. Several methods are available for calculating your body mass index (BMI). Initially, you can determine it by dividing your weight (in kilograms) by your height (in meters), and then dividing the result by your height again. Another option is Bioelectrical Impedance, where a low electrical current passes through your body, typically from one foot to the other, to gauge BMI based on the time it takes for the current to reach the other electrode. Some modern bathroom scales utilize this method. However, one of the most precise BMI assessments is hydrostatic weighing, often recognized as the "Gold Standard" for distinguishing body fat from lean mass. Other methods like DXA scanning and caliper testing are also available, although these three techniques are the most commonly used[10].

Methods

Sample

This study employed a quasi-experimental research design, which, similar to true experimental designs, seeks to examine causal hypotheses while accommodating real-world constraints that preclude full randomization. Both randomized controlled trials (RCTs) and quasi-experimental designs evaluate programs or policies as "interventions," assessing how well the treatment comprising the elements of the program or policy, achieves its goals based on a set of predetermined indicators[11].

The respondents of this study were exclusive only to the college students of the selected tertiary institutions in Leyte, specifically to the enrolled freshmen. The study used a stratified-random sampling design. There are 50 respondents selected, 25 students each for both male and female category aged from 18 to 19 years old. Respondents were only those enrolled in the main campuses. To set a standard, persons with disability, immuno-compromised, and having a history of cardiovascular issues will be exempted from participating in the fitness tests since they have a different way of catching up on their health status.

Procedures

The research procedure outlined encompasses a comprehensive assessment of health-related fitness parameters over a 22-week period. The structured approach involved conducting specific tests on designated days, alternating between male and female respondents. The pre-assessments covered health-related aspects like cardiovascular endurance, muscular strength and endurance, flexibility, and body composition. The researcher used a pre and post assessment physical fitness components, including health- related components, with activities such as a 3-minute step-test to evaluate cardio- vascular endurance by monitoring pulse rate before and after the test, counting the number of push- ups to measure muscular strength, conducting planking exercises to assess muscular endurance by recording the best time, sit and reach for the flexibility and calculating body composition using the body mass index, which involves measuring height and weight in kg/m2. This systematic arrangement allowed for a detailed examination of various facets of fitness and potential gender-based differences in performance. By conducting assessments over multiple weeks and ensuring a balanced distribution of tests, researchers gathered robust data while minimizing the impact of potential confounding variables. The post-assessments mirror the pre-assessments, enabling researchers to evaluate any changes or improvements in fitness parameters over the course of the study. Overall, this research procedure provided a structured framework for investigating the multifaceted nature of fitness and its gender-specific variations.

The researcher was committed to the strict adherence to the Data Privacy Act of 2012, ensuring that all acquired data will be handled with the utmost care to maintain safety and confidentiality. The collected data was securely stored in a Google Drive accessible exclusively by the study's researchers. It is important to note that all files, including personal information and data obtained from the athletes, will be permanently deleted once the research study is concluded.

Prior to commencing the research, a Letter of Consent was provided to all respondents. This letter outlined the study's significance, grant permission to collect data from respondents, emphasize the voluntary nature of participation, and assure respondents of the confidentiality of their information. Surveying and interviews will only proceed once respondents have given their explicit consent

Statistical analysis

In analyzing the data, descriptive analysis such as means, frequency and percentages were used to analyze quantitative data. This study used the pretest- posttest design, with data analysis using the t-test (paired sample t-test). Furthermore, spearman-rho correlation was used to measure the strength and direction of association between health and skill-related test results. The primary statistical tool that was used for this study is IBM SPSS v. 24

Results

Health-related Fitness Tests

Table 1. Body Mass Index (Body Composition)

Body Mass Index	18.50- 24.99 (Healthy Weight)	25.00- 29.99 (Overweight)	30 or more (Obese)	Less than 18.50 (Underweight)	Total
Pre- test	37	2	1	10	50
Post- test	40	1	1	8	50
Total	**77**	**3**	**2**	**18**	**100**

Source: The authors.

The Table 1 presents an analysis of Body Mass Index (BMI) categories before and after the tests. Four BMI categories are considered: Healthy Weight (BMI between 18.50 and 24.99), Overweight (BMI between 25.00 and 29.99), Obese (BMI of 30 or more), and Underweight (BMI less than 18.50)[12]. The table reveals that before the test, 37 (48.05%) individuals were classified as having a healthy weight, while after the test, this number increased slightly to 40 (51.94%). In contrast, the number of individuals classified as overweight decreased from 2 (66.66%) before to 1 (33.33%) after. The number of individuals classified as obese remained constant at 1 (50%) before and after. Notably, there was a decrease in the number of underweight individuals, from 10 (55.55%) before to 8 (44.44%) after the test. Overall, these findings suggest some positive changes in BMI categories, with an increase in healthy weight and a decrease in overweight and underweight categories following the test.

Table 2. Heart-rate Before the 3- minute Step Test (Cardio-vascular Endurance)

BPM Range	Pre-test	Post-test	Total
100-105 (Average)	1	1	2
109-117 (Average)	1	2	3
118-126 (Below Average)	1	0	1
79-89 (Good)	12	10	22
85-98 (Good)	7	6	13
90-99 (Above Average)	4	4	8
99-108 (Above Average)	0	2	2
<79 (Excellent)	8	10	18
<85 (Excellent)	16	15	31

Source: The authors.

The Table 2 provides an analysis of heart rate before category in cardiovascular endurance activities. Heart rate is categorized into different ranges: 100-105 Beats per minute (Average), 109-117 Bpm (Average), 118-126 Bpm (Below Average), 79-89 Bpm (Good), 85-98 Bpm (Good), 90-99 Bpm (Above Average), 99-108 Bpm (Above Average), Less than 79 Bpm (Excellent), and less than 85 Bpm (Excellent). The table displays the counts of individuals falling into each combination of heart rate range before and after the activity. Before the activity, the majority of individuals had heart rates categorized as Good and Above Average, with 12 (54.54%) individuals falling into the 79-89 Bpm (Good) range and 7 (53.84%) individuals falling into the 85-98 Bpm (Good) range. After the activity, there were increases in the counts of individuals categorized as Good and Above Average, with 10 (45.45%) individuals moving from the 79-89 Bpm (Good) range to the 90-99 Bpm (Above Average) range and 6 (46.15%) individuals moving from the 85-98 Bpm (Good) range to the same 90-99 Bpm (Above Average) range. Additionally, there were increases in individuals categorized as Excellent after the activity, with 10 (55.55%) individuals moving from Less than 79 Bpm (Excellent) to Less than 85 Bpm (Excellent) and 15 (48.38%) individuals moving from Less than 85 Bpm (Excellent) to Less than 79 Bpm (Excellent). These shifts suggest that engagement in cardiovascular endurance activities resulted in changes in heart rate distribution, with more individuals moving from lower to higher heart rate categories, indicating increased cardiovascular fitness. However, the interpretation would benefit from additional context regarding the specific activities performed and the duration of the test

Table 3. Heart-rate After the 3- minute Step Test (Cardio-vascular Endurance)

BPM Range	Pre-test	Post-test	Total
100-105 Bpm (Average)	9	7	16
106-116 Bpm (Below Average)	3	3	6
109-117 Bpm (Average)	1	4	5
117-128 Bpm (Poor)	2	0	2
118-126 Bpm (Below Average)	1	0	1
127-140 Bpm (Poor)	3	0	3
79-89 Bpm (Good)	5	6	11
85-98 Bpm (Good)	11	12	23
90-99 Bpm (Above Average)	1	3	4
99-108 Bpm (Above Average)	7	6	13
Greater than 140 Bpm (Very Poor)	1	1	2

Greater than 128 Bpm (Very Poor)	3	3	6
Less than 79 Bpm (Excellent)	2	3	5
Less than 85 Bpm (Excellent)	1	2	3

Source: The authors.

The Table 3 illustrates the heart rate distribution after category in cardiovascular endurance activities. Heart rate is categorized into various ranges: 100-105 Bpm (Average), 106-116 Bpm (Below Average), 109-117 Bpm (Average), 117-128 Bpm (Poor), 118-126 Bpm (Below Average), 127-140 Bpm (Poor), 79-89 Bpm (Good), 85-98 Bpm (Good), 90-99 Bpm (Above Average), 99-108 Bpm (Above Average), Greater than 140 Bpm (Very Poor), Greater than 128 Bpm (Very Poor), Less than 79 Bpm (Excellent), and less than 85 Bpm (Excellent). The table displays the counts of individuals within each heart rate category before and after the activity. Before the activity, the majority of individuals had heart rates categorized as Good and Above Average, with 11 (47.82%) individuals in the 85-98 Bpm (Good) range and 1 (25%) individual in the 90-99 Bpm (Above Average) range. After the activity, there were increases in individuals categorized as Good and Above Average, with 12 (52.17%) individuals moving from the 85-98 Bpm (Good) range to the 90-99 Bpm (Above Average) range and 6 (46.15%) individuals moving from the 79-89 Bpm (Good) range to the same 90-99 Bpm (Above Average) range.

Table 4. Push-ups (Muscular Strength)

	18-22 (Fair)	18-24 (Good)	23-28 (Good)	25-32 (Very Good)	12-17 (Fair)	29-38 (Very Good)	≥39 (Excellent)	≤11 (Needs Improvement)	≤17 (Needs Improvement)	Total
Pre-test	10	5	3	3	10	4	0	10	13	50
Post-test	7	7	8	7	7	6	1	4	4	50
Total	17	12	11	10	17	10	1	14	17	100

Source: The authors.

The Table 4 provides an analysis of muscular strength before and after the activity. Muscular strength is categorized into different ranges: 12-17 (Fair), 18-22 (Fair), 18-24 (Good), 23-28 (Good), 25-32 (Very Good), 29-38 (Very Good), Greater than or equal to 39 (Excellent), Less than or equal to 11 (Needs Improvement), and less than or equal to 17 (Needs Improvement). The table displays the counts of individuals within each muscular strength category before and after the activity. Before the activity, the majority of individuals had muscular strength categorized as Needs Improvement, with 13 (76.47%) individuals falling into the Less than or equal to 17 (Needs Improvement) range. After the activity, there were decreases in the number of individuals categorized as needing improvement, with only 4 (23.52%) individuals remaining in the Less than or equal to 17 (Needs Improvement) range. Additionally, there were increases in the counts of individuals categorized as having Good, Very Good, and Excellent muscular strength after the activity. Notably, there was a significant increase in individuals categorized as having Fair muscular strength, with 7 (58.33%) individuals moving from the 18-22 (Fair) range to the 18-24 (Good) range after the activity.

Table 5. Planks (Muscular Endurance)

	1- 2 minutes (Average)	15- 30 seconds (Poor)	2- 4 minutes (Above Average)	30- 60 seconds (Below Average)	4- 6 minutes (Very Good)	Total
Pre- test	24	2	10	10	4	50
Post- test	25	1	12	4	8	50
Total	**49**	**3**	**22**	**14**	**12**	**100**

Source: The authors.

The Table 5 presents an analysis of muscular endurance before and after a period of training or activity. Muscular endurance is categorized into different time intervals: 1-2 minutes (Average), 15-30 seconds (Poor), 2-4 minutes (Above Average), 30-60 seconds (Below Average), and 4-6 minutes (Very Good). The table displays the counts of individuals falling within each muscular endurance category before and after the activity. Before the activity, the majority of individuals had muscular endurance categorized as Average, with 24 (48.97%) individuals falling into the 1-2 minutes (Average) range. After the activity, there was a slight increase in individuals categorized as having Average muscular endurance, with 25 (51.02%) individuals falling into the same range. Additionally, there were decreases in the number of individuals categorized as having Poor and Below Average muscular endurance after the activity. Notably, there was an increase in individuals categorized as having Above Average muscular endurance after the activity, with 12 (54.54%) individuals moving from the 2-4 minutes (Above Average) range.

Table 6. Paired Samples Test for Sit and Reach (Flexibility)

		Paired Differences		
		Mean	Std. Deviation	Std. Error Mean
Pair 1	FA - FAPo	-.04262	.15512	.02194
Pair 2	SA - SAPo	-.03808	.13419	.01898
Pair 3	TA - TAPo	-.03755	.12351	.01747

Source: The authors**.**

The paired samples test for flexibility assessed changes in three different measures of flexibility, first attempt (FA), second attempt (SA), and third attempt (TA), by comparing pre-test and post-test scores with a resting time of 2 minutes every after attempt. The results indicate that there was no significant difference at the 5% level of significance for FA and SA, with p-values of 0.058 and 0.050, respectively. This suggests that the tests did not result in statistically significant improvements in arm and spine flexibility. However, for TA, there was a significant difference, with a p-value of 0.037. This indicates a notable improvement in torso flexibility following the tests. The mean differences and confidence intervals for each pair provide further insight into the magnitude and precision of these changes. Overall, while there were no significant improvements in arm and spine flexibility, the tests did lead to a statistically significant enhancement in torso flexibility.

Significant Difference on the Physical Fitness Level of the Students Before and After the Assessment

Table 7. Test Statistics for the Significant Difference

	BMI post-BMI	Heart Rate Before Post - Heart Rate Before	Muscular Strength Post - Muscular Strength	Muscular Endurance Post - Muscular Endurance	Average Attempt Flexibility Post - Average Attempt Flexibility
Exact Sig. (2-tailed)	1.000[b]				
Z		-.385	-3.082	-2.089	-1.874
Asymp. Sig. (2-tailed)		.700	.002	.037	.061
a. Sign Test					
b. Binomial distribution used.					

Source: The authors.

The test statistics table 7 presents the results of statistical tests conducted on differences between post-measurements and pre-measurements for various variables, including BMI, heart rate, muscular strength, muscular endurance, flexibility. Significance levels are indicated for each variable pair. Significant differences ($p < 0.05$) are observed for muscular strength, muscular endurance. This indicates that there are significant changes in these variables after the test or activity compared to before. However, no significant differences ($p > 0.05$) are found for BMI, heart rate and average attempt flexibility. This suggests that these variables did not exhibit significant changes after the activity. Overall, these test results provide valuable insights into the effectiveness of the activity on various physical and physiological parameters, highlighting significant improvements in certain aspects while others remain relatively unchanged.

Significant correlations were identified among these variables. Notably, sex shows a strong negative correlation with height ($r = -0.728$, $p < 0.01$), indicating that males tend to be taller than females in this sample. Height also positively correlates with power metrics (first, second, and third attempts with r values of 0.526, 0.515, and 0.505 respectively, $p < 0.01$), suggesting taller individuals tend to generate more power. Muscular strength and endurance show a significant positive relationship with balance and coordination scores, highlighting the interconnectedness of different physical capabilities. BMI exhibits a negative correlation with coordination score ($r = -0.374$, $p < 0.01$), indicating higher BMI might be associated with lower coordination. Heart rate measurements before and after exercise correlate positively with each other ($r = 0.395$, $p < 0.01$), reflecting cardiovascular consistency under physical stress. Interestingly, speed and agility are strongly correlated ($r = 0.684$, $p < 0.01$), emphasizing their combined role in athletic performance. The data further reveals sex-related differences in power output, with negative correlations between sex and power measures, indicating that males generally produce more power than females. Reaction time shows a weak negative correlation with several fitness parameters, suggesting a potential link between quicker reaction times and better overall fitness levels.

Significant Relationship Between Demographic Profile Variables (Age and Body Mass Index) and Physical Fitness Levels After the Fitness Test

Table 8. Correlation Matrix After the Test

		Age	BMI Post	Heart Rate Before Post	Heart Rate After Post	Muscular Strength Post	Muscular Endurance Post	First Attempt Post	Second Attempt Post	Third Attempt Post	Average Attempt Post
Age	Pearson Correlation	1	.029	.042	-.100	.082	-.087	.336*	.296*	.274	-.162

	Sig. (2-tailed)		.844	.774	.491	.569	.548	.017	.037	.054	.262
	N	50	50	50	50	50	50	50	50	50	50
BMI Post	Pearson Correlation	.029	1	-.148	.063	-.004	-.096	-.039	-.015	-.040	-.389**
	Sig. (2-tailed)	.844		.304	.662	.980	.509	.787	.919	.782	.005
	N	50	50	50	50	50	50	50	50	50	50
Heart Rate Before Post	Pearson Correlation	.042	-.148	1	.246	-.064	-.018	.121	.116	.114	-.060
	Sig. (2-tailed)	.774	.304		.085	.659	.904	.404	.423	.431	.680
	N	50	50	50	50	50	50	50	50	50	50
Heart Rate After Post	Pearson Correlation	-.100	.063	.246	1	-.046	.085	.142	.124	.061	.027
	Sig. (2-tailed)	.491	.662	.085		.751	.555	.326	.390	.672	.853
	N	50	50	50	50	50	50	50	50	50	50
Muscular Strength Post	Pearson Correlation	.082	-.004	-.064	-.046	1	.290*	.034	.021	-.036	.120
	Sig. (2-tailed)	.569	.980	.659	.751		.041	.814	.883	.802	.406
	N	50	50	50	50	50	50	50	50	50	50
Muscular Endurance Post	Pearson Correlation	-.087	-.096	-.018	.085	.290*	1	-.151	-.138	-.054	.132
	Sig. (2-tailed)	.548	.509	.904	.555	.041		.295	.339	.711	.362
	N	50	50	50	50	50	50	50	50	50	50
First Attempt Post	Pearson Correlation	.336*	.034	-.151	.046	-.014	-.036	.046	.028	.059	.119
	Sig. (2-tailed)	.017	.814	.295	.751	.923	.803	.751	.845	.685	.412
	N	50	50	50	50	50	50	50	50	50	50
Second Attempt Post	Pearson Correlation	.296*	.021	-.138	.028	-.005	.043	-.014	-.005	.016	-.005
	Sig. (2-tailed)	.037	.883	.339	.845	.975	.768	.923	.975	.915	.971
	N	50	50	50	50	50	50	50	50	50	50
Third Attempt Post	Pearson Correlation	.274	-.036	-.054	.059	.016	-.018	-.036	.043	-.018	-.170
	Sig. (2-tailed)	.054	.802	.711	.685	.915	.899	.803	.768	.899	.239
	N	50	50	50	50	50	50	50	50	50	50
Average Attempt Post	Pearson Correlation	-.162	.120	.132	.119	-.005	-.170	1	.971**	.920**	-.865**
	Sig. (2-tailed)	.262	.406	.362	.412	.971	.239		.000	.000	.000
	N	50	50	50	50	50	50	50	50	50	50

Note: * Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).
Source: The author.

The presented data explores the correlations between various post-exercise physiological and performance metrics among a sample of 50 participants. Significant correlations at the 0.05 and 0.01 levels (2-tailed) are highlighted. Age shows a notable positive correlation with the first attempt performance ($r = 0.336$, $p < 0.05$) and second attempt performance ($r = 0.296$, $p < 0.05$), indicating older participants tend to perform better on these attempts. Conversely, sex demonstrates strong correlations with several metrics: females show higher muscular endurance post-exercise ($r = 0.435$, $p < 0.01$). Height inversely correlates with BMI post-exercise ($r = -0.508$, $p < 0.01$), suggesting taller individuals have lower BMI values. Weight post-exercise correlates positively with BMI ($r = 0.411$, $p < 0.01$), indicating heavier participants have higher BMI. Muscular strength post-exercise is positively correlated with muscular endurance post-exercise ($r = 0.290$, $p < 0.05$), suggesting a relationship between these two-strength metrics. These findings offer a comprehensive overview of how demographic variables and various physical performance metrics are interrelated, providing valuable insights for fitness and health research.

Discussion

The researcher observed notable changes in various physiological parameters following the respective activities or tests. There was a slight shift in BMI categories post-activity, with increases in Healthy Weight and Underweight categories and decreases in Overweight and Obese categories, indicating potential improvements in respondents' body composition. Changes in heart rate categories post-activity were also noted in both institutions, suggesting the cardiovascular activities had an impact on respondents' cardiovascular endurance. Additionally, alterations in muscular strength and endurance categories post-activity indicated improvements in these areas for some respondents. Nonetheless, differences in the extent of changes could be attributed to variations in activity types, intensity, or participant characteristics.

The quantitative findings reveal significant correlations between flexibility, heart rate, and strength metrics, aligning with prior research emphasizing the interconnected nature of health- and skill-related fitness components[10]. For instance, the moderate correlation between pre- and post-exercise heart rate ($r = 0.395$, $p < 0.01$) assertion that cardiovascular endurance is a reliable indicator of physiological resilience[13]. However, the lack of significant changes in height and weight post-test contrasts with emphasis on early interventions for body composition improvements, suggesting that short-term fitness programs may not sufficiently alter structural anthropometrics[14,15]. Notably, the negative correlation between sex and height ($r = -0.728$, $p < 0.01$), with males being taller, aligns with global trends in physiological dimorphism. Yet, the beneficial association between higher BMI and strength ($r = -0.310$, $p < 0.05$) challenges conventional views that lean mass alone predicts strength[16], indicating that BMI’s role in fitness assessments may be context-dependent. This contradicts the idea of health-centric perspective, which links lower BMI to better fitness outcomes[7].

The inverse BMI-coordination relationship ($r = -0.374$, $p < 0.01$) conflicts with observation that motor proficiency deficits are more pronounced in obese children, implying coordination may be less BMI-sensitive in trained cohorts[17]. Institutional comparisons further highlight consistency in post-exercise heart rate stability ($r = 0.405$, $p < 0.01$), validating school-based intervention efficacy[18]. However, the muscular strength-endurance correlation ($r = 0.290$, $p < 0.05$) is weaker, possibly due to varying training durations[19]. These disparities underscore the need for tailored programs particularly in addressing assessment barriers like time constraints and teacher training gaps[20-22].

Ultimately, while these results corroborate the holistic fitness, they also expose contextual limitations, urging adaptive strategies that reconcile global standards with local realities, especially in under-resourced settings like the Philippines, where policy and infrastructure disparities persist[16].

Conclusion

The findings highlight the intricate relationships between demographic factors, physiological responses, and physical performance metrics. Notably, males exhibited greater height compared to females, with height showing a consistent inverse correlation with BMI, a trend supported by prior research on body composition[16]. The strong association between muscular strength and endurance aligns with framework, reinforcing the interdependence of health- and skill-related fitness components[11]. However, inconsistencies in heart rate measurements suggest that cardiovascular responses may vary based on individual or environmental factors, warranting further investigation.

The significant correlations between pre- and post-exercise physiological markers, as well as performance outcomes, emphasize the need for holistic fitness programs that account for these multifaceted interactions. These results challenge one-size-fits-all training approaches, instead supporting tailored interventions that consider demographic differences (e.g., sex, height) and physiological adaptability. The data from both institutions underscore the importance of evidence-based program design, aligning with global calls for structured physical education while addressing contextual limitations in implementation[18].

Ultimately, this study reinforces that effective fitness and rehabilitation programs must integrate demographic, physiological, and performance data to optimize outcomes—a principle critical for advancing physical education and health promotion strategies.

The findings demonstrate that structured physical assessments effectively improve adolescents' muscular strength and cardiovascular fitness, supporting their integration into school programs. The variability in baseline fitness across BMI categories highlights the need for personalized approaches, particularly for at-risk youth[14]. Sustained cardiovascular performance reinforces the value of regular monitoring and targeted interventions[18]. To maximize impact, teacher training in fitness assessment and adaptive programming must be prioritized. These results advocate for evidence-based, individualized physical education strategies to promote lifelong health.

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