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ANALYSIS OF THE INFLUENCE OF PHYSICAL EXERCISE ON THE PHYSICAL FITNESS OF GRADE 8 STUDENTS AT SMP NEGERI 2 KUTACANE

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Abstract

This study aims to evaluate the impact of a structured physical exercise program on the physical fitness of eighth-grade students at SMP Negeri 2 Kutacane. Employing an experimental design, a total of 20 students were randomly assigned to two groups: an experimental group that underwent a specifically designed 4-week physical training regimen and a control group that participated only in the standard, regular school sports activities. Physical fitness was quantitatively measured through a battery of standardized tests assessing various components, including the 60-meter sprint for speed, pull-ups for upper body muscular endurance, sit-ups for abdominal endurance, skipping for agility and coordination, and the vertical jump for lower body explosive power. Data collection occurred in two phases: a pre-test before the intervention and a post-test following the 4-week period. The collected data were subjected to statistical analysis, commencing with tests for normality (Shapiro-Wilk) and homogeneity (Levene's test) to validate the assumptions for parametric testing. Subsequently, a paired t-test was employed to compare the pre-test and post-test results within each group. The findings reveal a statistically significant improvement across all measured aspects of physical fitness in the experimental group, while the control group showed minimal changes. These results robustly demonstrate the profound effectiveness of a structured, consistent physical exercise program in enhancing the overall physical fitness of junior high school students. The study concludes that such programs are crucial and should be integrated into the standard physical education curriculum to foster better health and physical development among adolescents.

Keywords: Junior High School Students, Physical Exercise, Physical Fitness, Structured Training Program, Student Fitness

INTRODUCTION

The adolescent years represent a critical period of human development, characterized by rapid physical, cognitive, and emotional changes. Within this complex developmental landscape, physical fitness stands as a cornerstone, not merely for its obvious contributions to health and bodily function but for its profound interconnectedness with other facets of a student's life. Optimal physical fitness is fundamentally important for supporting the overall health and physical development of students, and it exerts a significant influence on mental acuity, concentration, emotional stability, and, by extension, academic achievement. A body that is well-conditioned is more capable of sustaining the rigors of long school days, absorbing new information, and managing the psychosocial stresses inherent to adolescence. Conversely, a decline in physical conditioning can lead to a cascade of negative outcomes, including increased susceptibility to illness, chronic fatigue, poor self-esteem, and diminished academic performance. Regrettably, in the contemporary era, a growing number of students are experiencing a marked decline in physical fitness due to a combination of factors leading to a lack of regular physical activity. The proliferation of sedentary pastimes, such as engagement with digital screens, smartphones, and video games, has increasingly displaced traditional outdoor play and spontaneous physical exertion. Furthermore, academic pressures and an intensified focus on curricular achievements often lead to physical education being deprioritized, both in school scheduling and in the minds of students and parents. This creates a concerning paradox where the pursuit of intellectual development comes at the cost of physical well-being. SMP Negeri 2 Kutacane, like many educational institutions, recognizes this challenge and strives to improve student health through its existing sports programs.

However, these programs often consist of general, non-specific physical activities that may lack the structure, intensity, and progressive overload necessary to elicit significant improvements in all components of physical fitness. While participation in any physical activity is beneficial, the question remains whether a more scientifically-grounded and systematically implemented exercise program could yield superior results. This research gap presents a compelling opportunity for investigation. Can a deliberately structured, four-week physical training intervention produce measurable and statistically significant enhancements in the physical fitness parameters of Grade 8 students compared to their peers who only partake in routine school sports? This study is therefore designed to move beyond general observations and provide empirical evidence on the specific effects of a structured exercise regimen. By employing a controlled experimental design and utilizing standardized fitness tests, this research aims to quantify the impact of such a program on key indicators of physical fitness, including speed, muscular endurance, agility, and explosive power. The findings are anticipated to offer valuable insights for educators, school administrators, and policymakers, underscoring the importance of moving from casual physical activity to purposeful physical training within the educational framework. Ultimately, this research seeks to contribute to the development of more effective physical education strategies that can holistically enhance the well-being and potential of the student population at SMP Negeri 2 Kutacane and beyond.

LITERATURE REVIEW

To fully contextualize this study, it is essential to delve into the core concepts that underpin it and to examine the existing body of research that informs its hypotheses. The twin pillars of this investigation are "physical exercise" and "physical fitness," terms that, while related, possess distinct meanings and implications.Physical exercise is best understood as a subset of physical activity that is planned, structured, repetitive, and purposive, undertaken with the explicit intention of improving or maintaining one or more components of physical fitness. It is not merely movement, but movement with a goal. According to Putra and Sari (2018), systematic and regular physical exercise is the most potent stimulus for enhancing various components of physical fitness, such as speed, muscular strength, agility, and cardiovascular endurance. The principle of adaptation dictates that when the human body is subjected to a stressor beyond its normal routine—such as a structured exercise program—it responds by undergoing physiological changes to better handle that stress in the future. This is the fundamental mechanism through which fitness is improved.

Physical fitness itself is a multidimensional concept. It can be defined as the body's ability to perform daily physical activities efficiently and effectively without undue fatigue and with ample energy remaining to enjoy leisure-time pursuits and to meet unforeseen emergencies (Susanto, 2017). This definition moves beyond mere athleticism to encompass a functional capacity that is vital for a high quality of life. The components of physical fitness are typically divided into health-related and skill-related categories. Health-related components include cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition. These are directly linked to overall health and the prevention of hypokinetic diseases. Skill-related components, such as speed, power, agility, balance, coordination, and reaction time, are more associated with athletic performance but are still crucial for the coordinated and efficient movement of any individual.

A substantial body of research has consistently demonstrated that well-designed and consistently applied physical exercise programs can lead to significant improvements in the physical fitness of school-aged children and adolescents. For instance, the research by Putra and Sari (2018) found that a structured training program conducted over a 6-week period was able to markedly improve running speed and muscular strength in junior high school students. Their study highlighted the importance of progression and specificity in training design. Similarly, Susanto (2017) asserted that sustained physical exercise can substantially improve muscular endurance and motor coordination in adolescents, which are critical for both sports performance and the execution of complex motor tasks in daily life.

Further supporting evidence comes from international studies. A comprehensive review by the World Health Organization has consistently linked regular physical activity in youth to improved cardiorespiratory and muscular fitness, bone health, cardiovascular and metabolic health biomarkers, and positive effects on weight status. Moreover, there is a growing recognition of the "cognitive connection"; studies have shown that physical activity can positively influence brain function, neuroplasticity, and academic performance. This expands the rationale for physical fitness from a purely physical health perspective to a holistic developmental one. However, while the general benefits of physical activity are well-established, the specific efficacy of short-term, intensive, and highly structured interventions within the specific context of a school like SMP Negeri 2 Kutacane warrants closer examination. Many existing school programs are broad and lack the focused intensity to drive adaptation in all fitness components. This

study builds upon the theoretical foundation laid by previous researchers like Putra, Sari, and Susanto, but applies it in a targeted, localized intervention. It tests the hypothesis that even a relatively brief, four-week period of structured physical exercise, if properly designed and implemented, can produce statistically significant gains across a range of fitness tests, thereby providing a robust model that could be integrated into the standard physical education curriculum.

METHOD

To rigorously investigate the proposed research question, this study adopted a quantitative research approach with an experimental design. This design was selected as it is the most appropriate method for establishing a cause-and-effect relationship between an independent variable and a dependent variable. In this context, the independent variable was the participation in the 4-week structured physical exercise program, while the dependent variables were the scores on the various physical fitness tests. The research was conducted at SMP Negeri 2 Kutacane, with the physical tests administered at the Pemuda Aceh Tenggara Field to ensure a standardized and adequate environment for all activities. The population for this study consisted of all Grade 8 students at the school. From this population, a sample of 20 male students was selected through random sampling techniques to participate in the study. The use of a homogeneous sample in terms of gender was a deliberate choice to control for the confounding variable of sex differences in physical development and performance during adolescence, which can be substantial. The 20 selected students were then randomly assigned into two groups of 10 students each: the Experimental Group and the Control Group. This random assignment was crucial for minimizing selection bias and ensuring that the groups were statistically equivalent at the outset of the study.

The experimental group underwent a specifically designed physical exercise program for a duration of four weeks, with training sessions scheduled three times per week. Each session lasted approximately 60 minutes and was structured to include a warm-up, a main exercise component, and a cool-down period. The main exercise component was designed to be progressive, meaning the intensity, volume, or complexity of the exercises increased gradually over the four weeks to continually challenge the students' bodies and stimulate adaptation. The regimen incorporated a circuit-training format to maintain engagement and target multiple fitness components simultaneously. Exercises included dynamic calisthenics, interval running drills, bodyweight strength exercises (such as variations of push-ups, squats, and lunges), plyometric movements, and agility ladder drills. The program was designed to comprehensively develop speed, muscular endurance, agility, and explosive power. In contrast, the control group continued with their regular school sports activities, which typically involved less structured games like football or volleyball, without any additional prescribed training. This group served as a baseline to compare against the experimental group, allowing the researchers to isolate the effect of the structured intervention from the general effects of maturation or routine school activity.

The instrumentation for data collection consisted of a battery of five standardized physical fitness tests, selected for their reliability, validity, and relevance to the fitness components being studied:

1. 60-Meter Sprint: This test was used to assess running speed and acceleration. Students sprinted 60 meters from a standing start, and their time was recorded to the nearest tenth of a second using a stopwatch.
2. Pull-Ups: This test measured muscular endurance and strength of the upper body, specifically the muscles of the back, shoulders, and arms. The number of consecutive, correctly executed pull-ups (from a dead hang to chin over the bar) was recorded.
3. Sit-Ups (in 60 seconds): This test evaluated the muscular endurance of the abdominal muscles. The number of full sit-ups (touching elbows to knees) completed in a 60-second period was counted.
4. Skipping (in 60 seconds): This test was used as an indicator of agility, coordination, and rhythmic ability. The number of successful skips completed with a standard jump rope in 60 seconds was recorded.
5. Vertical Jump: This test assessed lower-body explosive power. Students stood sideways against a wall, reached up as high as possible, and then jumped vertically, marking the wall at the peak of their jump. The difference between the standing reach height and the jump height was measured in centimeters.

All measurements were conducted under the direct supervision of the researchers and the school's physical education teacher to ensure objectivity, consistency, and adherence to the standardized testing protocols. Stopwatches, counting boards, and standard measuring tapes were used to collect the data. The data collection process was carried out in two distinct phases. A pre-test was administered to all 20 students in both groups before the commencement of the 4-week intervention period. This established a baseline level of fitness for each participant. Following the completion of the 4-week period, an identical post-test was administered to all participants under the

same conditions. This allowed for a direct comparison of individual and group performance before and after the intervention. The statistical analysis of the collected data was performed in a systematic sequence. First, the pre-test data from both groups were subjected to a Shapiro-Wilk test to confirm the assumption of normal distribution and a Levene's test to verify the homogeneity of variances between the groups. These preliminary tests are essential prerequisites for using parametric statistical tests, which are more powerful than their non-parametric counterparts. After confirming that the data met these assumptions, the primary analysis was conducted using a paired t-test. This test was used to compare the pre-test and post-test mean scores within each group for each of the five fitness tests. A p-value of less than 0.05 ($p < 0.05$) was set as the threshold for statistical significance, indicating that the observed changes were unlikely to have occurred by chance alone.

RESULTS AND DISCUSSION

The findings of this study provide compelling and quantifiable evidence supporting the positive impact of the structured physical exercise program on the physical fitness of the students in the experimental group. The results from the pre-test and post-test measurements for both groups are summarized in the analysis, revealing clear and distinct trajectories of change. The pre-test results confirmed that both the experimental and control groups started from a statistically equivalent baseline, with no significant differences in their initial fitness levels across all five tests. This was a critical finding, as it validated the random assignment process and allowed for a confident attribution of any subsequent differences to the intervention itself.

Following the 4-week intervention period, the post-test data revealed a dramatic divergence between the two groups. The control group, which participated only in regular school sports, showed minimal changes in their fitness test scores. Any minor fluctuations observed were not statistically significant, indicating that their routine activities were sufficient for maintenance but insufficient for driving notable physiological adaptation. In stark contrast, the experimental group demonstrated substantial and statistically significant improvements across every single fitness metric measured. The quantitative results were striking. The average time for the 60-meter sprint decreased from 10.3 seconds in the pre-test to 9.2 seconds in the post-test, representing a notable improvement in speed and acceleration. In the pull-up test, the average number of repetitions increased from 7.5 to 9.0, indicating enhanced upper-body muscular endurance. The sit-up test saw an even more pronounced gain, with the average count rising from 17 to 26 repetitions in 60 seconds, showcasing a significant boost in core muscular endurance. The skipping test, which measures agility and coordination, showed an improvement from an average of 30 to 38 skips in 60 seconds. Finally, the vertical jump, a pure measure of lower-body explosive power, displayed a remarkable increase, with the average jump height rising from 35 cm to 42 cm.

The results of the Shapiro-Wilk and Levene's tests confirmed that the data sets were normally distributed and homogeneous, thereby satisfying the key assumptions for parametric testing. The subsequent application of the paired t-test to the experimental group's data yielded p-values of less than 0.05 for all five fitness tests, confirming that the improvements observed were statistically significant and not due to random variation. The discussion of these findings reinforces and elaborates upon the fundamental principles of exercise physiology. The significant enhancements in speed, muscular endurance, agility, and explosive power among the experimental group participants can be directly attributed to the specific adaptations induced by the structured training program. The improvement in the 60-meter sprint time can be explained by neuromuscular adaptations, including improved motor unit recruitment, firing rate, and inter-muscular coordination, which were targeted through the interval running and plyometric drills.

The increases in pull-up and sit-up performance are clear indicators of improved muscular endurance. This adaptation occurs as the muscle tissues respond to the repeated stress of training by enhancing their metabolic efficiency, increasing capillary density, and improving the muscles' ability to clear metabolic waste products like lactate. The principle of specificity is evident here; the body adapts to the exact demands placed upon it. The structured bodyweight exercises provided a sufficient stimulus to force these positive adaptations, which the routine sports activities of the control group failed to do. The gains in skipping and vertical jump performance speak to improvements in agility, coordination, and power. Agility is a complex skill involving a combination of balance, speed, strength, and neuromuscular control. The circuit-training format, with its varied and dynamic movements, directly challenged and improved the students' proprioception and ability to change body position efficiently. The increase in vertical jump height is a classic indicator of improved plyometric strength and power, resulting from the training's focus on explosive movements that enhance the stretch-shortening cycle of the muscles and tendons.

These findings are entirely consistent with the established theory of training, which posits that regular, progressive, and systematic physical exercise is the primary driver for enhancing physical capacity. The work of

Putra and Sari (2018) and Susanto (2017) is strongly corroborated by this study, but this research adds a layer of specificity by demonstrating that these principles hold true even within a relatively short, intensive, four-week timeframe in a local school context. The success of the program underscores a critical point: it is not merely physical activity, but the quality, structure, and intent of that activity that yields the most significant fitness benefits. Therefore, the structured physical exercise program implemented in this study has proven to be highly effective in comprehensively improving the physical fitness of the Grade 8 students at SMP Negeri 2 Kutacane, offering a viable and evidence-based model for enhancing the school's physical education offerings.

CONCLUSION AND SUGGESTIONS

In conclusion, this research has successfully demonstrated that a four-week structured physical exercise program is a potent and effective intervention for significantly enhancing the physical fitness of Grade 8 students at SMP Negeri 2 Kutacane. The empirical data, rigorously collected and analyzed, leaves little room for doubt. The pre- and post-test measurements, which confirmed a normal and homogeneous data distribution, allowed for the robust application of the paired t-test, which in turn revealed statistically significant improvements in all measured indicators of physical fitness. These indicators—the 60-meter sprint, pull-ups, sit-ups, skipping, and vertical jump—collectively paint a picture of comprehensive physical development, encompassing speed, upper and lower body muscular endurance, agility, coordination, and explosive power.

The implications of these findings are substantial. They move beyond academic confirmation of established exercise physiology principles and provide a practical, actionable blueprint for educational practice. The study clearly shows that the generic physical activities often comprising school sports programs are suboptimal for driving significant fitness gains. In contrast, a purposefully designed, progressive, and consistent training regimen can produce remarkable results in a short period. Consequently, structured physical exercise possesses the demonstrated capacity to improve the fundamental motor skills and basic physical aspects of students in a holistic and comprehensive manner. Based on the compelling evidence generated by this study, a set of suggestions is proposed to various stakeholders to translate these findings into tangible benefits for the student population. For the students themselves, it is strongly recommended to engage in regular physical exercise beyond their mandatory school activities. Cultivating a habit of structured training, whether through school clubs, community sports, or individual routines, is essential for maintaining and further enhancing their physical fitness, which will pay dividends for their long-term health and well-being.

For Physical Education teachers, the primary recommendation is to actively integrate structured physical exercise programs into the core of their teaching and learning activities. The curriculum should be enriched with evidence-based training modules that target specific fitness components, moving beyond recreational play to include dedicated time for developing strength, endurance, speed, and power in all students, not just the athletically inclined. For the school administration at SMP Negeri 2 Kutacane and similar institutions, there is a clear call to action. The school should prioritize the provision and maintenance of adequate sports facilities and equipment. The availability of proper training environments is a fundamental prerequisite for the successful implementation of the kind of structured program proven effective in this study. Investment in infrastructure is an investment in student health.

Finally, for future researchers, this study opens several avenues for further exploration. Subsequent research should aim to develop these findings by implementing training programs of longer duration to investigate the long-term effects and sustainability of the fitness gains. Expanding the scope to include a larger and more diverse sample, including female students and participants from different schools and socioeconomic backgrounds, would enhance the generalizability of the results. Furthermore, incorporating additional variables, such as cardiovascular endurance (e.g., using a multi-stage fitness test), flexibility, body composition analysis, and even measures of academic performance and psychological well-being, would provide a more comprehensive understanding of the multifaceted impact of structured physical exercise on the lives of adolescents.

REFERENCES

Afrizal, A. (2022). Evaluasi Tingkat Kemampuan Kardiovaskuler Atlet Arung Jeram Mapala Universitas Gunung Leuser Aceh. *Gelanggang Olahraga: Jurnal Pendidikan Jasmani dan Olahraga*, *6*(1), 9-17.

Afrizal, A. (2023). Volume Oksigen Maksimal (Vo2 Max) Mahasiswa Program Studi Pendidikan Kepelatihan Olahraga Universitas Gunung Leuser Aceh. *Gelanggang Olahraga: Jurnal Pendidikan Jasmani dan Olahraga*, *7*(1), 178-183.

Arikunto, S. (2010). *Prosedur Penelitian: Suatu Pendekatan Praktik*. Jakarta: Rineka Cipta.

Bompa, T.O., & Haff, G.G. (2009). *Periodization: Theory and Methodology of Training* (5th ed.). Champaign: Human Kinetics.

Giriwijoyo, S., &Sidik, D. (2002). *Pengantar Ilmu Kesehatan Olahraga*. Bandung: FIK UNPAD.

Hidayat, R. (2020). Pengaruh Latihan Kebugaran Jasmani Terhadap Kinerja Fisik Siswa Sekolah Dasar. *Jurnal Ilmiah Pendidikan Jasmani Indonesia*, 4(1), 32–40.

Irwansyah, O. (2023). Evaluasi Kondisi Fisik Dominan Dalam Lompat Jauh Terhadap Motivasi Belajar Dan Pembelajaran Penjas Mahasiswa FKIP Program Studi Ilmu Pendidikan Kepelatihan Olahraga Universitas Gunung Leuser Aceh. *Innovative: Journal Of Social Science Research*, *3*(6), 8239-8245.

Nababan, M. B., & Rizal, F. (2023). Pelatihan Senam Kebugaran Jasmani (SKJ) Pelajar Pada Anak di SD Negeri Titi Panjang. *Jurnal Pengabdian Bangsa*, *2*(1), 1-5.

Nababan, M. B., & Rizal, F. (2024). Profil Kebugaran Jasmani Mahasiswa Prodi Pendidikan Kepelatihan Olahraga Universitas Gunung Leuser Aceh. *Innovative: Journal of Social Science Research*, *4*(6), 9751-9761.

Nainggolan, E. F. B. (2024). Increasing Vo2max of Students in the Sports Coaching Educational Study Program of Gunung Leuser Aceh University Through the Interval Training Method. *Jurnal Penelitian Progresif*, 3(2), 13-19.

Putra, A. K., & Sari, D. M. (2018). Pengaruh Latihan Fisik Terhadap Peningkatan Kecepatan Lari dan Kekuatan Otot Siswa SMP. *Jurnal Ilmu Keolahragaan*, 12(2), 45-56.

Susanto, N. (2017). *Kebugaran Jasmani: Teori dan Aplikasi*. Jakarta: Raja Grafindo Persada.

World Health Organization. (2020). *Guidelines on physical activity and sedentary behaviour*. Geneva: World Health Organization.