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Assessment of the Potential of Elementary School Students in terms of Physical Fitness

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Abstract. Primary education is an essential foundation for developing all the potential possessed by students, including physical fitness. The persistent inadequacy in children's physical fitness levels raises critical concerns regarding their overall health and well-being, necessitating urgent attention and intervention. This study aimed to assess the physical fitness of elementary school students, evaluate the effectiveness of the Indonesian Physical Fitness Test in measuring their physical fitness, and give policy recommendations. The quantitative descriptive method was used in this study due to its ability to provide numerical data analysis, facilitate systematic measurement, and allow comparative analysis and generalization. Incidental sampling was used to select 120 primary school learners in the Sidoarjo district. Two sets of fitness tests were administered based on child development phases: the Around the World Test for Phase B and a 600m running test for Phase C. Crosstabs analysis on SPSS revealed that male and female learners exhibited similar physical fitness levels, mainly within moderate and healthy categories. Differences were observed based on the phase or grade level (chi-squared=43.843, p=0.000), with Phase B learners generally having moderate to good fitness, while Phase C learners demonstrated lower and middle levels. Overall, there was a decline in fitness with higher grade levels, emphasizing the necessity to rejuvenate physical education for enhanced fitness. Instilling the importance of maintaining and improving physical fitness from a young age is crucial, and both teachers and students can actively contribute by improving their comprehension of physical literacy through training or by integrating it into the physical education curriculum.

Keywords: Assessment; Physical Education; Physical Fitness.

1. Introduction

The early identification of various student potentials is crucial to ensure that the education process can provide optimal services in developing these potentials into achievements. Education is expected to deliver more comprehensive and targeted services by profoundly understanding individual potential from the early stages. This includes not only cognitive and emotional potentials but also physical fitness, which plays a significant role in a student's overall well-being and ability to perform daily activities efficiently. The goal is to ensure every student has a fair opportunity to achieve maximum success in various aspects of life, laying a solid foundation for their sustained development. This understanding forms the basis for education that is responsive to the needs of each individual, shaping them not only as intelligent learners but also as holistically developing individuals, ready to face the physical and mental demands of the future.

In this context, a profound understanding of students' potential from an early age is vital to creating inclusive and supportive education for optimal student growth. Various research outcomes underscore the importance of mastering skills and competencies related to information and communication technology, globalization, and the need for innovation among primary school students (Chalkiadaki, 2018). However, the development of these

potentials must be noticed, especially in terms of health. Several studies indicate that aspects such as active lifestyle, physical fitness, body composition, overweight, and obesity significantly correlate with the development of students' potential (Augestad & Jiang, 2015; Chen et al., 2018; Hills et al., 2015).

Therefore, a holistic understanding of the relationship between physical fitness and physical health becomes crucial in designing a comprehensive and sustainable educational approach. As a supportive aspect of developing children's potential, physical fitness must be enhanced by promoting physical activity in schools (Messing et al., 2019; Naylor et al., 2015). The success of promoting increased physical activity and physical fitness yields various health benefits encompassing physical, mental, cognitive, and psychosocial functions (Bull et al., 2020; Chaput et al., 2020; McKinney et al., 2016).

In essence, schools need to ensure that students maintain adequate physical activity to mitigate the negative impacts of a sedentary lifestyle on health and simultaneously enhance physical fitness. Physical fitness is a primary indicator of health from childhood through adolescence (Kolimechkov, 2017; Ortega et al., 2015). Thus, the assessment of physical fitness in children provides crucial information that can be utilized to safeguard and improve children's health."

1.1. Problem Statement (CG 10, Bold)

The current state of physical fitness indices among children aged 10-15 years in Indonesia is alarming. According to the reports from the Index of Sports Development (IPO), the physical fitness index of the Indonesian population within the 10-15 age group has consistently fallen into the 'insufficient' category over the past three years, spanning from 2021 to 2023 (Mutohir et al., 2023). Notably, the physical fitness of this demographic needs to be improved, as highlighted by multiple studies (Kurniawan, 2021; Pratamalloh et al., 2023). Furthermore, primary school students' physical fitness is also predominantly categorized as insufficient, as evidenced by various research findings (Pradana et al., 2023; Priadana & Suwandi, 2023; Putra & Kurniawan, 2023; Syam, 2023). This concerning trend persists despite a few instances where the physical fitness of primary school students is classified as sufficient or moderate (Andra & Putri, 2023; Trisnata et al., 2020). The persistent inadequacy in children's physical fitness levels raises critical concerns regarding their overall health and well-being, necessitating urgent attention and intervention.

1.2. Related Research

Several studies contribute valuable insights into the relationship between physical activity, cognitive function, and overall health in developing individuals. Gomes da Silva and Arida (Gomes da Silva & Arida, 2015) found that physical activity enhances cognitive function in individuals undergoing development. Emphasizes the importance of children mastering various movement competencies at the elementary education level to ensure continuous physical activity throughout their lives (Hulteen et al., 2015).

Addressing the challenges in promoting increased physical activity becomes essential, especially in the current modern environment that fosters sedentary lifestyles. Rozanski (Rozanski, 2023) highlights the risk factors associated with sedentary lifestyles, activating pathophysiological pathways and increasing the risk of chronic diseases and premature death in the future. Schools play a pivotal role in guaranteeing that students maintain sufficient physical activity levels to mitigate the negative impacts of sedentary lifestyles on health and enhance physical fitness.

The significance of physical fitness as a primary indicator of health from childhood to adolescence is supported by Ortega et al. (Ortega et al., 2015). Their research establishes a connection between childhood/adolescent fitness and parameters related to adiposity and cardiometabolic health later in life (García-Hermoso et al., 2019). Physical fitness assessment in children provides crucial information that can be utilized to safeguard and improve children's health.

In the context of health evaluation, Ramírez-Vélez et al. (Ramírez-Vélez et al., 2015)emphasize the significant components of physical fitness assessments, including morphological, musculoskeletal, flexibility, and cardiorespiratory components. Various studies, including those by Bull et al. (Bull et al., 2020) and Poitras et al. (Poitras et al., 2016), support the idea that these components can be improved through daily physical activity participation meeting recommended guidelines – a minimum of 60 minutes per day at moderate to high intensity.

The close relationship between daily physical activity, especially with moderate intensity and prolonged duration in line with active living promotion, also influences cardiorespiratory fitness (Jankowski et al., 2015). Notably, the measurement of cardiorespiratory fitness in physical fitness assessments is believed to have advantages in supporting various physical activity programs and interventions with significant impacts (Braaksma et al., 2018). These findings open the door to a better understanding of the relationship between physical activity and physical fitness, laying the groundwork for more effective approaches in health promotion through physical activity and sports.

Based on previous research, a comprehensive understanding of the relationship between physical activity, cognitive function, and overall health in developing individuals has been established, with particular emphasis on the importance of physical activity during childhood and adolescence for long-term health outcomes. Several studies have highlighted the benefits of physical activity on cognitive function, the risks associated with sedentary lifestyles, and the importance of physical fitness assessments in monitoring and improving health. However, more research is needed on the physical fitness of children at different levels in elementary schools, the effectiveness Indonesian Student Fitness Test, and policy recommendations.

1.3. Research Objectives

This research aims to provide a comprehensive understanding of the physical fitness levels of primary school students, the effectiveness of the Indonesian Students Fitness Test, and policy recommendations. By measuring and analyzing the physical fitness levels of primary school students across various grades, this research provides concrete data on the current state of children's physical health. This data can serve as a baseline for future studies and interventions. The research evaluates the effectiveness and accuracy of the Indonesian Students Fitness Test in assessing the fitness levels of primary school students. This assessment helps in determining whether the Indonesian Students Fitness Test is a reliable tool for measuring physical fitness in this demographic, potentially leading to improvements or validations of the test. The research provides evidence-based recommendations for policymakers to enhance physical education policies and practices in schools. By presenting concrete data and analyses, the study supports the creation of policies that promote regular physical activity and improve overall student health.

2. Theoretical Framework

The theoretical framework of this study is anchored in the importance of measuring the physical potential of children on a large scale, which supports the inventory of children's potential when compared to national and international standards. The measurement of cardiorespiratory fitness, commonly employed at the international level, enables the identification of trends in the physical fitness conditions of children (Tomkinson et al., 2019). These measurements necessitate specific analyses based on various variables, including gender and simultaneous changes in morphological and cardiovascular covariates in line with age and maturation. Allows for hierarchical allometric modeling to provide a method of data analysis that is rigorous, flexible, and sensitive (Armstrong & Welsman, 2020).

Physical fitness is a critical component of overall health and can be measured using various fitness tests (Pate et al., 2012). The assessment of specific fitness qualities is essential in the training process, as it can be used to quantify the effects of training and be a health marker (Jeffries et al., 2022). The physical fitness test is used to help students develop lifelong habits of regular physical activity (Ayers, 2011). The built environment is also important in physical activity and can be assessed using various methods (Pontin et al., 2022). National and global

frameworks exist to support the development of physical activity initiatives and monitor and evaluate their implementation (Kosowan et al., 2022). Assessing the potential of elementary school students' physical fitness is thus crucial for fostering long-term health and activity habits, supported by both local environments and broader policy frameworks.

Through the Ministry of Education and Culture, the Indonesian government has established national standards for physical fitness measurements, categorized into class phases ranging from A to F (*TKSI Kemdikbud*, 2023). These measurements are suitable for classroom activities, particularly in physical education (PE). Therefore, the data obtained from the assessment of physical fitness development serves as the foundation for designing specific treatments to enhance the psychomotor aspects of students through PE classes. The theoretical framework emphasizes the alignment of international measurement practices with national standards and the practical application of these measurements within the educational context to inform targeted interventions for the holistic development of students.

3. Method

3.1. Research Design

The type of research used is a quantitative descriptive method, which is a method that describes certain circumstances as thoroughly and carefully as possible. The quantitative descriptive method was used in this study due to its ability to provide numerical data analysis, facilitate systematic measurement and allow comparative analysis. The variable that will be descriptively explained is the level of physical fitness. Meanwhile, the aspects that may correlate with it are gender, grade level, and class phase will be correlated to check for causality.

3.2. Respondent

There were 120 learners involved in this study (male= 61 and female= 59, age range 8-12 years), selected through a purposive sampling technique. The students were in phases B (grades 3-4) and C (grades 5-6) of an elementary school in an area in Sidoarjo district. They performed 2 sets of Indonesian student physical fitness tests (https://tksi.kemdikbud.go.id/tksi/home): phase B did the Around the World Test, and phase C did the 600m run test.

3.3. Data Collection

The fitness test for phase B students is the Around the World Test, a modification of the Hoosier Endurance Suttle Run AU Physical Fitness (Hebert et al., 2021). It is done by students running back and forth for 15 meters by moving the ball to the basket provided. The test for phase C learners used the 600-meter run test, a modification of the Indonesian Physical Fitness Test (TKJI) (Adi, 2023). Students are encouraged to run as fast as possible, over 600 meters. Both were conducted to determine physical fitness related to lung and heart endurance or cardiorespiratory fitness.

3.4. Data Analysis

Data analysis used three types: descriptive statistics, t-tests, and crosstabs. Descriptive statistical analysis was used to determine the level of physical fitness for each Class that used the same test, namely classes 3-4 and 5-6. Crosstabs were used to compare the frequency of students in the fitness category. A T-test was used to compare the level of physical fitness in one phase. SPSS application was used in the whole process of data analysis.

3.5. Validity and Reliability

The Around the World Test was conducted for 6 minutes. Validity was characterized by $r = 0.381$, $p<0.05$. The 600-meter run test validity was characterized by $r = 0.545$, $p<0.05$ (https://tksi.kemdikbud.go.id/tksi/home).

4. Findings

The study results are described in three sub-chapters: level of physical fitness differences by gender and class, level of physical fitness differences by gender, and level of physical fitness differences by phase.

4.1. Level of Physical Fitness Differences by Gender and Class

Table 1 shows the results of the analysis of differences in physical fitness based on gender and Class in each phase. The analysis was conducted using an independent t-test with a significance of 0.05.

In phase B, the mean physical fitness level of grade 3 students was 20.96, Sd= 2.07, SE= 0.414, while grade 4 was 22.07, Sd= 2.69, SE= 0.509. The two means were equal with t= -1.669, p= 0.101>0.05. Male students' mean physical fitness level was 22.04, Sd= 2.862, SE= 0.551, while Female was 21.04, Sd= 1.886, SE= 0.37. Both means were equal with t= 1.505, p= 0.139>0.05.

In phase C, the mean physical fitness level of 5th Class students was 5.6, Sd= 1.06, SE= 0.188, while 6th Class was 5.97, Sd= 1.46, SE= 0.247. Both means were equal with t= -1.192, p= 0.238>0.05. Male students' mean physical fitness level was 5.61, Sd= 1.17, SE= 0.201, while Female was 5.99, Sd= 1.39, SE= 0.243. Both means were declared equal with t= -1.192, p= 0.238>0.05.

Table 1. Physical Fitness by Gender and Class

Phase	Aspect	N	Mean	Std. Deviation	Std. Error Mean	t	p
B*	3rd Class	25	20.96	2.07	0.414	-1.669	0.101
	4th Class	28	22.07	2.69	0.509		
	Male	27	22.04	2.862	0.551	1.505	0.139
	Female	26	21.04	1.886	0.370		
C**	5th Class	32	5.60	1.06	0.188	-1.192	0.238
	6th Class	35	5.97	1.46	0.247		
	Male	34	5.61	1.17	0.201	-1.192	0.238
	Female	33	5.99	1.39	0.243		

* physical fitness measured by Around the World Test in the amount of frequency
** Physical fitness measured by 600m run test in a minute

4.2. Level of Physical Fitness Differences by Gender

Table 2 shows the results of the analysis of differences in physical fitness based on gender in all phases or total data. The analysis was conducted using crosstabs or Chi-Square with a significance level 0.05.

Table 2. Level of Physical Fitness Differences by Gender

		Fitness category					Total	X^2	p
		Very poor	Poor	Average	Good	Very good			
Gender	Male	6	14	19	22	0	61	5.771	0.217
	Female	4	14	26	13	2	59		
Total		10	28	45	35	2	120		

For male learners, it is found that 6 people fall into the very poor category, 14 people fall into the poor category, 19 people fall into the average category, 22 people fall into the good category, and no male learners fall into the very good category. In female learners, it is found that as many as 4 people fall into the very poor category, 14 fall into the poor category, 26 fall into the average category, 13 fall into the good category, and 2 fall into the very good category. Based on the data tabulation, the chi-square value is 5.771, p = 0.217>0.05. It means there is no difference in students' physical fitness levels regarding gender differences.

4.3. Level of Physical Fitness Differences by Phase

Table 3 shows the analysis results of differences in physical fitness by phase for the total data. The analysis was conducted using crosstabs or Chi-Square with a significance level 0.05.

Table 3. Level of Physical Fitness Differences by Phase

		Fitness category					Total	X^2	p
		Very poor	Poor	Average	Good	Very good			
Phase	Phase B	0	1	32	20	0	53	43.843	0.000
	Phase C	10	27	13	15	2	67		
Total		10	28	45	35	2	120		

In phase B learners, it was found that there were no learners in the very poor category, 1 person in the poor category, 32 people in the average category, 20 people in the good category, and no phase B learners in the very good category. In phase C learners, it was found that as many as 10 people were in the very poor category, 27 were in the poor category, 13 were in the average category, 15 were in the good category, and 2 were in the very good category. Based on the data tabulation, the chi-square value is 43.843, p = 0.000 <0.05. It means there are differences in students' physical fitness levels regarding phase differences.

5. Discussion

The Around the World Test, conducted for 6 minutes, and the 600-meter run test have been deemed valid measures for assessing the physical fitness of children in Phases B and C. The validity of the Around the World Test is characterized by a correlation coefficient (r) of 0.381, with a significance level (p) of less than 0.05. Similarly, the validity of the 600-meter run test is characterized by a correlation coefficient of 0.545, also with a significance level of less than 0.05. These findings indicate that both tests exhibit statistically significant relationships with measures of physical fitness, suggesting their suitability for evaluating the physical fitness levels of children in Phases B and C. This validation supports the use of these tests as reliable tools in assessing and monitoring the physical fitness of children within these age groups.

There is no difference in the level of physical fitness based on gender in one phase or between phases. It indicates that the cardiorespiratory fitness condition of male and female students in grades 3-6 is the same. It is important to note that other studies have found gender differences in fitness (Diaz-Canestro et al., 2022; Priadana & Suwandi, 2023; Walker et al., 2020). However, these findings do not undermine the notion that gender influences movement participation in port. Instead, it shows that the environment and social interactions that limit women's physical activity have been successfully manipulated so that men and women perform similar physical activities (The Lancet Public Health, 2019). These results provide a basis for teachers in determining treatment for boys and girls, which can be the same in one phase because the physical fitness conditions of students are the same between boys and girls. In addition, this condition can be used as a basis that competition for physical fitness related to cardiorespiratory fitness is considered equal between men and women in one phase.

Another finding is that there are differences in physical fitness levels based on the different phases. Phase B tends to be fitter than Phase C. Grade level also shows the difference in the age level of the learners. This finding shows that learners' physical fitness level is inversely proportional to age level. Age is critical in determining a person's vital and essential motive to actively participate in physical activity (Molanorouzi et al., 2015). Handling the fulfilment of students' physical activity levels needs to pay attention to the age level. Where the level of children's participation in sports is inversely proportional to age, the increasing age decreases the level of children's participation in sports (Eime et al., 2016). In addition, age is an essential factor in determining motivation to actively participate in physical activities, with older students showing a decrease in participation in sports (Walker et al., 2020). Treatment needs for children

according to age use the assumption that the higher the age, the more intensive the fulfilment of students' physical activity levels. The utilization of leisure time in children must be directed at sports and recreational activities included in programmed physical activity (Eime et al., 2015).

The two significant findings in this study provide essential information to primary education teachers that treatment for learners can be equalized by gender but needs to be differentiated by age. Specialized treatments should meet the standards of planned learning even if they are done outside of Class (Chen et al., 2018). The menu for fulfilling learners' physical activity needs to be adjusted to the age level of the learners, where they have different habits according to maturity. Regardless of the treatment, the target of active lifestyle habituation should carry over to children's engagement in lifelong physical activity (Hulteen et al., 2017). It shows the importance of considering age differences in designing treatments and learning programs focusing on physical activity. By paying attention to these differences, teachers can develop treatments and learning programs that are more effective and suitable for the needs of students.

Although, limitation of the study is that its findings are specific to the sampled population and may not be generalizable to other contexts or age groups. Further research is needed to confirm these results across diverse settings. While the study suggests that the environment and social interactions have been manipulated to equalize physical activity between genders, it does not deeply explore these factors. A more detailed analysis of the specific environmental and social interventions that led to these results would be beneficial. However, the key strengths of the study are provision of actionable insights for educators, suggesting specific strategies to address physical activity needs based on gender and age. This practical guidance can help improve the physical education curriculum, educational policies, and promote lifelong physical activity habits. By showing no gender differences in physical fitness within the studied grades, the research challenges traditional assumptions about gender and physical activity, potentially influencing future studies and educational policies.

The implications for future study and practice are profound. The findings underscore the importance of designing physical activity programs that are age-appropriate and gender-neutral within the same age group. Educators should consider students' maturity levels and interests to foster a lifelong engagement in physical activity. Future research should track physical fitness and activity levels over a longer period to understand how they change with age and other factors. This could provide more comprehensive insights into the development of physical fitness throughout childhood and adolescence.

6. Conclusion

The persistent inadequacy in children's physical fitness levels raises critical concerns regarding their overall health and well-being, necessitating urgent attention and intervention. Male and female elementary school children's physical potential is relatively similar in cardiorespiratory fitness. However, it is different based on the phase level that represents age. An important conclusion from these findings is that the development of learners' physical potential needs to be carried out intensively by age development to provide habituation to a healthy lifestyle for learners to move throughout life actively. Instilling the importance of maintaining and enhancing physical fitness from a young age is crucial, and both teachers and students can actively contribute by enhancing their comprehension of physical literacy through training or by integrating it into the physical education curriculum and education polices in school.

Limitation

This study was severely limited by the sample size and school boundaries studied. The generalization of these findings needs to be supported by a more in-depth analysis to get a more accurate conclusion about the general condition of students in phases B and C. For this reason, future research can increase the validity of the findings by expanding the number of

samples and areas studied. A more extensive selection and variation in the research area may help represent learners' characteristics more comprehensively.

Recommendation

It is recommended to consider the inclusion of learners from different backgrounds or developing countries so that the information obtained can be more general and globally relevant. By conducting broader and more diverse research, it is hoped to provide a more in-depth and accurate understanding of the condition of learners, especially in phases B and C. It can make a more significant contribution to education in developing countries.

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Conflict of Interest

The Author(s) declare(s) that there is no conflict of interest.

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