



The Relationships between Physical Literacy with Physical Activity and Physical Fitness among High-School Students

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Abstract

Introduction: Recognizing the critical role of physical fitness (PF) in the healthy development of adolescents is of great importance.

Objective: This study sought to enhance the understanding of the interplay between physical literacy (PL), physical activity (PA), and within the high school educational setting.

Methods: This descriptive-correlational study involved primary school students aged between 15 and 18 years. A total of 384 adolescents, comprising 192 boys and 192 girls. To evaluate the research variables, the PLAY self-questionnaire, The Physical Activity Questionnaire for Adolescents, The American Alliance for Health, Physical Education, Recreation and Dance Physical Fitness Test were utilized, and the data were subjected to analysis through Pearson PF correlation test.

Results: The data reveals that the participants had a BMI of 21.55, which falls within the normal range. The analysis revealed a direct and significant relationship between PL and both PA ($P < 0.001$) and PF ($P < 0.001$). Additionally, a direct and significant correlation was found between PA and PF ($P < 0.001$).

Conclusion: The findings of this study underscore the significance of adopting a comprehensive approach to enhance PF among adolescents, emphasizing the cultivation of PL alongside the encouragement of consistent PA. Schools can promote an active lifestyle by installing outdoor fitness equipment in their playgrounds.

Keywords: Adolescent, Exercise, Physical Fitness, High-School

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1. Introduction

A significant challenge facing contemporary societies is the impact of apartment and car living, which has contributed to physical poverty and a sedentary lifestyle (1). This urban environment adversely affects the daily physical and sports activities of individuals, particularly children and adolescents (2). Furthermore, the rise of Internet technology and the proliferation of screen-based applications have encroached upon their leisure time, making it crucial to emphasize the importance of PA for this demographic (3). Engaging in regular exercise is vital for children's short- and long-term health, as it fosters both physiological and psychological resilience, equipping them to handle the stresses of adulthood and future work-related challenges (4,5). Consequently, it is imperative to address the excessive consumption of television and Internet usage promptly, as initial neglect in fostering appropriate activities can lead to mental and physical decline, ultimately resulting in increased stress. Given the diverse cognitive, social, emotional, moral, and physical dimensions of human development, families and educational systems must prioritize these aspects to facilitate comprehensive growth and advancement.

Physical literacy (PL) is a significant focus of the International Council of Sport Sciences and Physical

Education under UNESCO, encompassing motivation, self-confidence, physical competence, and the knowledge necessary to appreciate and engage in physical activities (6). It represents a crucial aspect of a child's overall health capabilities. This concept extends beyond traditional physical education and organized sports, offering the potential to reshape perceptions of physical strength and activity through targeted teaching and innovative approaches (7). By fostering these qualities, PL can encourage a broader demographic to actively participate in physical pursuits, enhancing their motivation and engagement (8). PL encompasses the acquisition of essential motor and sports skills that enable children to engage in a variety of physical and rhythmic activities with motivation, confidence, and control (9). It also involves the ability to respond effectively to environmental factors and make informed decisions based on their understanding of their surroundings. This concept serves as a valuable framework for evaluating PA and its effects on both physical and mental well-being (10). Individuals with higher levels of PL tend to reap greater health benefits from regular physical engagement. The four fundamental components outlined by the International Physical Literacy Association have formed the foundation for initiatives aimed at enhancing PL across various nations. In children,



fostering PL promotes active and self-assured participation in sports and physical activities (7,9).

Individuals exhibiting desirable PL typically demonstrate several key characteristics. They navigate physically demanding situations with balance, efficiency, and confidence. Such individuals possess a strong awareness of their bodies in relation to their surroundings, which fosters self-esteem and self-confidence through effective interaction with their environment (6,7). This self-assuredness enables them to trust their physical capabilities, allowing for empathetic engagement with others, characterized by high levels of support and understanding throughout various life stages. Furthermore, they are adept at recognizing and articulating the factors that influence their motor performance, as well as comprehending the principles of physical health, including exercise, sleep, and nutrition (8,9). Conversely, a lack of PL is associated with reduced participation in physical activities and an increased risk of health issues. Consequently, the prevalent inactivity among many children underscores the urgent need to enhance the behavioral aspects of PL (6,10).

High school adolescents represent a pivotal demographic in terms of health and development. This stage of life is crucial for establishing lifestyle choices and habits that significantly influence long-term health outcomes (11,12). Over the past twenty years, there has been a notable decline in PA levels across all age demographics, including adolescents. Alarming, more than 80% of adolescents worldwide fail to engage in adequate PA, with estimates indicating that 80.3% do not adhere to established guidelines (13,14). Studies indicate that children and adolescents from economically disadvantaged backgrounds and ethnic minorities exhibit lower levels of PA (13). Furthermore, PA tends to diminish with age, as opportunities for active commuting to school and play decrease, while sedentary behaviors continue to increase (14). In addition, physical fitness (PF) plays a vital role in the overall development of adolescents, particularly those in high school (15). In today's digital age, the noticeable decrease in PA among young people has become a worldwide issue. This trend not only jeopardizes their physical health but also poses risks to their academic success and psychosocial well-being.

Recognizing the critical role of PF in the healthy development of adolescents and the potential influence of PL on enhancing PA, this study sought to examine the relationships among PL, PA, and PF in high school students. Gaining insights into these connections is anticipated to inform the creation of effective intervention strategies aimed at boosting students' levels of PA and fitness, while also enriching the existing body of research on PL. This investigation aims to provide a comprehensive understanding of how PL, PA, and PF interact within the high school educational framework. The innovative aspect of this study lies in its implications for physical education policy and practice, promoting the formulation of more impactful intervention programs designed to enhance the health and fitness of high school students.

2. Methods

2.1. Design and Participants

This descriptive-correlational study involved primary school students aged between 15 and 18 years.

A total of 384 adolescents, comprising 192 boys and 192 girls, were chosen based on a sample size calculation appropriate for correlational research, with parameters set at $\alpha=0.05$, $\beta=0.05$, and $r=0.20$. The average age of the participants was 16.96 years, with a standard deviation of 0.42. Participants were recruited through convenience sampling and had to fulfill specific inclusion criteria, which included being high school students, obtaining parental consent, completing necessary protocols, and having no physical conditions that would hinder their participation. Failure to complete the questionnaires or provide written consent prevented participants from taking part in the study. Parental consent was secured prior to the assessment process.

2.2. Measurements

2.2.1. Physical Literacy

PL was assessed using the PLAY self-questionnaire (16). This self-assessment tool is designed for children and adolescents to evaluate their PL levels across four subdomains focusing on environment, self-reported PL, comparative assessment of Literacy, Numeracy, and Physical Literacy, and fitness. The overall score is calculated by summing the points from the first three subdomains and dividing by the total number of questions, which is 27. A maximum score of 100 indicates a strong self-concept of PL. In this research, the Cronbach's alpha coefficient was determined to be 0.93, indicating excellent internal consistency.

2.2.2. Physical Activity

The Physical Activity Questionnaire for Adolescents (PAQ-A) was utilized to assess PA levels of participants. This self-reported tool consists of nine questions, each scored on a scale from 1 to 5, where a score of 1 indicates minimal activity and a score of 5 represents the highest activity level. The overall PA score is calculated by summing the scores from all questions and averaging them, yielding a final score that ranges from 1 to 5. Specifically, scores between 1 and 2.33 denote low PA, scores from 2.34 to 3.66 indicate moderate PA, and scores above 3.67 are classified as high PA levels. In this study, the Cronbach's alpha coefficient was found to be 0.96, reflecting excellent internal consistency.

2.2.3. Physical Fitness

The American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD) Physical Fitness Test was employed to evaluate the health-related PF levels of the students (18). This test is designed for school-aged boys and girls and assesses various components of fitness, including upper body strength, endurance, flexibility, and coordination. In this research, specific PF indicators measured included pull-ups, sit-ups, a 560-meter run, and flexibility assessments.

2.3. Statistical Analysis

Descriptive statistics, including mean and standard deviation (SD), were utilized to illustrate the study's variables. The Pearson correlation test was executed to analyze the relationships among the research variables. A significance threshold of 0.05 was established, and data analysis was performed using SPSS version 27.

3. Results

The mean and SD for age, weight, height, and BMI of the participants are presented in [Table 1](#). The data

reveals that the participants had a BMI of 21.55, which falls within the normal range.

Table 1. Demographic Data across Gender.

	Age	Weight	Height	BMI
Total	16.96 ± 0.42	60.55 ± 3.14	168.45 ± 4.92	21.55 ± 1.23
Boys	16.94 ± 0.40	65.69 ± 3.47	173.28 ± 5.97	21.90 ± 1.59
Girls	16.98 ± 0.46	55.49 ± 2.87	161.85 ± 4.19	21.20 ± 1.40

[Table 2](#) presents the means and standard deviations for PL, PA, and PF, along with an analysis of gender differences. The results reveal significant disparities between boys and girls in several areas: PL scores were 62.15±6.57 for boys compared to 47.93±4.23 for girls ($t = 12.579, P < 0.001$), while PA levels were 3.02±0.41 for boys and 2.05±0.18 for girls ($t = -22.964, P < 0.001$). Additionally, boys outperformed girls in PF measures, including pull-ups (18.67±2.65 for boys vs. 10.75±1.07 for

girls, $t = 18.968, P < 0.001$), sit-ups (34.65±4.25 for boys vs. 23.26±2.84 for girls, $t = 15.557, P < 0.001$), and the 560-meter run (152.59±9.69 for boys vs. 168.66±7.20 for girls, $t = 8.920, P < 0.001$). However, no significant difference was found in flexibility, with scores of 26.40±2.41 for boys and 26.31±2.32 for girls ($t = -0.529, P = 0.638$). These results suggest that boys exhibit higher levels of PL, activity, and fitness compared to girls.

Table 2. Mean and SD of PL, PA and PF across Gender.

	Total	Boys	Girls	Comparison
Physical Literacy	55.80 ± 4.76	62.15 ± 6.57	47.93 ± 4.23	$t=12.579$ $P<0.001$
Physical Activity	2.49 ± 0.26	3.02 ± 0.41	2.05 ± 0.18	$t=-22.964$ $P<0.001$
Physical Fitness				
Pull-Ups	14.85 ± 1.64	18.67 ± 2.65	10.75 ± 1.07	$t=18.968$ $P<0.001$
Sit-Ups	28.94 ± 3.37	34.65 ± 4.25	23.26 ± 2.84	$t=15.557$ $P<0.001$
Run	160.23 ± 8.47	152.59 ± 9.69	168.66 ± 7.20	$t=8.920$ $P<0.001$
Flexibility	26.34 ± 2.38	26.40 ± 2.41	26.31 ± 2.32	$t=-0.529$ $P=0.638$

Furthermore, [Table 3](#) presents the findings from the Pearson correlation tests. The analysis revealed a direct and significant relationship between PL and both PA

($P < 0.001$) and PF ($P < 0.001$). Additionally, a direct and significant correlation was found between PA and PF ($P < 0.001$).

Table 3. Results of Pearson Correlation between Research Variables.

	1	2	3	4	5	6
1. Physical Literacy	-					
2. Physical Activity	$r=0.834$ $P<0.001$	-				
3. Pull-Ups	$r=0.476$ $P<0.001$	$r=0.429$ $P<0.001$	-			
4. Sit-Ups	$r=0.638$ $P<0.001$	$r=0.481$ $P<0.001$	$r=0.583$ $P<0.001$	-		
5. Run	$r=0.558$ $P<0.001$	$r=0.576$ $P<0.001$	$r=0.667$ $P<0.001$	$r=0.637$ $P<0.001$	-	
6. Flexibility	$r=0.369$ $P<0.001$	$r=0.374$ $P<0.001$	$r=0.470$ $P<0.001$	$r=0.468$ $P<0.001$	$r=0.507$ $P<0.001$	-

4. Discussion

This study sought to enhance the understanding of the interplay between PL, PA, and PF within the high school educational setting. Data analysis indicated that high school students participated in moderate levels of PA, with boys exhibiting significantly higher activity levels than girls. This observation is consistent with prior research that underscores a troublingly low engagement in health-related physical activities among children and adolescents (19-21). As a result, it can be inferred that inadequate PA is a widespread concern in this age group, particularly among girls. Factors contributing to this issue may include limitations in educational programs, insufficient access to sports facilities and equipment, financial barriers associated with certain sports, and existing cultural attitudes (19,21). Thus, it is essential to

prioritize PA behaviors of adolescents in the development of health-related interventions and programs.

The findings indicated a strong and significant connection between PL and both PA and PF. Moreover, a notable correlation was established between PA and PF. Despite the limited research exploring the links among PL, PA, and PF in adolescents, this study's results are consistent with earlier studies (22-25) and suggest that PL positively influences both PA and PF in this demographic. These findings indicate a complex relationship between PL and PA, both of which are essential factors in fostering and improving PF. This suggests that PL could play a vital role in creating lasting patterns of PA beginning in early development (23,25).

The motivational and self-confidence aspects of PL significantly contribute to fostering engagement in

physical activities. These insights bolster the notion that enhancing PL serves as a viable approach to encourage active lifestyles among adolescents (26,27). PL is a comprehensive concept that includes physical competence, motivation, confidence, knowledge, and understanding, all of which are essential for sustained engagement in physical activities throughout life. Evidence suggests a robust correlation between PL and PF among adolescents, underscoring the necessity of fostering both cognitive and emotional aspects of PL within physical education curricula (28,29). Research indicates that a significant number of young individuals fail to achieve recommended levels of PA and often exhibit deficiencies in PL areas, particularly in cardiovascular fitness and self-efficacy. A systematic review and meta-analysis of PL interventions revealed notable positive outcomes across various PL dimensions, with the most pronounced effects observed in physical competence (30,31). These results highlight the importance of implementing focused strategies in physical education programs to improve students' PL, which should encompass not only physical abilities but also the knowledge, understanding, and motivation necessary for active lifestyles (32,33). In addition, motivation plays a crucial role in embracing a long-term physically active lifestyle. While PL is essential for enhancing PF, it is equally important to recognize that factors like exercise motivation significantly impact this process (34-36). Finally, self-care practices among adolescents are significantly shaped by their PL, underscoring the necessity of integrating PL into preventive initiatives. By imparting PL skills in conjunction with effective educational strategies, it becomes essential to promote PA and support the overall health of adolescents (37,38).

The current study has several limitations. It focused exclusively on high school students, overlooking the influence of factors such as their social and economic backgrounds. Additionally, the research relied solely on questionnaires to evaluate the variables, which may introduce biases inherent in self-reported data.

4.1. Conclusion

The findings of this study underscore the significance of adopting a comprehensive approach to enhance PF among adolescents, emphasizing the cultivation of PL alongside the encouragement of consistent PA. These results can inform the creation of more effective interventions and educational policies aimed at promoting the health and fitness of high school students. Enhancing PF necessitates a more thorough and vigorous strategy that goes beyond merely expanding knowledge; it also involves fostering motivation for increased PA. Educational institutions can enhance their PA programs by implementing regular initiatives, such as weekly healthy gymnastics sessions and conducting fitness assessments every three months. Furthermore, schools can promote an active lifestyle by installing outdoor fitness equipment in their playgrounds.

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Footnotes

Authors' Contribution: This study was carried out solely by the corresponding author.

Conflicts of Interest

Non to declare.

Data Availability: The data that support the findings of this study are openly available upon request from the corresponding author.

Ethical Approval: The author confirms that all steps and requirements of this study comply with ethical guidelines. Participants were informed about the characteristics of the study and gave written informed consent.

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