

**Correlation of Physical Activity with Behavioral, Emotional, and Psychosocial Disorders: A Cross-Sectional Study of 5 Elementary Schools in Ciherang Village****Agustina Agustina¹, Fransisca Iriani R Dewi¹, Susy Olivia Lontoh^{2*}, Yohanes Firmansyah², William Gilbert Satyanegara², Valentino Gilbert Lumintang², Kasvana Kasvana², Geoffrey Christian Lo²**¹Faculty of Psychology, Universitas Tarumanagara, Jakarta, Indonesia²Faculty of Medicine, Universitas Tarumanagara, Jakarta, Indonesia**ARTICLE INFO****Keywords:**

Children

Emotional and behavioral disorders

Physical activity

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All authors have reviewed and approved the final version of the manuscript.

<https://doi.org/10.37275/cmej.v5i2.554>

A B S T R A C T

Physical activity is essential for children, but unfortunately, it has decreased due to the development of technology. Sedentary behavior in children can cause growth disorders, such as obesity, diabetes, heart disease, and high blood pressure. It can also affect child development, including emotional and behavioral disorders, decreased self-confidence, and symptoms of depression. This cross-sectional study was conducted in February-March 2024 in five Ciherang Elementary Schools. The study included 246 children who met the inclusion criteria. Physical activity was assessed using the IPAQ questionnaire, while emotional and behavioral disorders were assessed using the pediatric symptom checklist 17 (PSC-17) questionnaire. Their mean age was 11.83 years. The mean IPAQ score was 62.21 (16.45), and the mean PSC-17 score was 11 (2 - 27). The study found no significant correlation between physical activity and emotional, behavioral, and psychosocial disorders (internalization; p-value = 0.322, attention; p-value=0.515, and externalization; p-value=0.059, and total PSC17 score; p-value=0.944). However, a correlation was found between physical activity and externalizing behavior, with an r-correlation value of 0.121 and an R square of 0.016. Physical activity is associated with externalizing behavior, particularly in children between 10 and 14.

1. Introduction

Physical activity is a fun, healthy activity for everyone, including children. Physical activity is done by children generally to make friends, have fun, and learn new things.¹ There are 3 types of physical activity that should be done: aerobics (such as walking, running, swimming, dancing, cycling, and jumping rope), muscle strengthening (including activities like climbing trees and ropes, playing with tools on the playground, and gymnastics), and bone strengthening (which involves jumping and participating in sports like tennis, basketball, and gymnastics).²

However, in modern times, many children do not do physical activity, but instead, choose to sit and spend their time in front of the computer. This sedentary behavior is linked to chronic diseases such

as diabetes, high blood pressure, heart disease, cancer, and premature death. There are only 25% of children in the United States who meet the daily recommendation of 60 minutes of daily exercise, and this situation has further deteriorated because of the COVID-19 epidemic. Persisting on this behavior will lead to children developing excessive weight and obesity.³

Keeping children active not only promotes physical well-being but also plays a crucial role in maintaining good psychological and psychosocial health.⁴ Mental health issues have been reported by a range of 10-20% of children globally, and this proportion is rising in tandem with the COVID-19 pandemic, which has resulted in stress and social isolation for children. Physical activity in adequate quantities enhances

children's self-perception, self-efficacy, self-esteem, and self-confidence. In both boys and girls, solitary living is linked to social isolation, excessive social media usage, feelings of loneliness, and depressive symptoms.⁵ The relationship between physical activity and emotional and behavioral disorders in children will be examined in this study. The participants of this research will be elementary school students residing in the Ciherang Village.

2. Methods

This study utilizes a cross-sectional design and is an analytical observational investigation. The study was conducted at five primary schools in Ciherang Village from February to March 2024. The study's population comprises elementary school students in the fifth and sixth grades from SDN A, SDN B, SDN C, SDN D, and SDN E. The study's inclusion criteria required participants to be at least ten years old. The research excluded students who were considered uncooperative, faced difficulties in engaging in two-way communication, had limited understanding of Indonesian, or were not allowed by their parents.

The level of physical activity was evaluated using the expanded version of the International Physical Activity Questionnaire (IPAQ). The objective of the IPAQ is to collect data regarding the physical activity engaged in by participants during the week prior. The IPAQ includes surveys covering a broad spectrum of physical activities, such as cycling or walking, household tasks, and park trips. The IPAQ protocol involves the fulfillment of a self-administered questionnaire.

The pediatric symptom checklist 17 (PSC-17) is a brief assessment tool specifically developed to identify and assess changes in emotional and behavioral disorders in children. PSC-17 is not used for diagnosis but serves as a screening tool to detect and track early emotional and behavioral issues in children. This helps to enable timely intervention and therapy. The PSC-17 consists of three subscales: internalization, externalization, and attentiveness. Behavioral,

emotional, or psychosocial illnesses should be regarded with suspicion if any of the following four conditions are present: 1) A minimum score of 5 is required on the total internalization subscale. 2) The total externalization subscale requires A minimum score of 7. 3) A minimum score of 7 is required on the total attention subscale. 4) The overall score sheet requires a minimum score of 15.

The current research analysis includes both descriptive and analytical components. Qualitative data uses proportions (%), whereas quantitative data is presented using centralized data distribution. The statistical test used in this research includes the Spearman correlation test with a type I error rate of 5%.

3. Results and Discussion

Two hundred forty-six adolescents fulfilled the inclusion criteria for this study. The following information is presented in Table 1. It includes demographic characteristics such as age and gender, physical activity scores obtained from the International Physical Activity Questionnaire (IPAQ), and the overall scores obtained from the pediatric symptom checklist 17. The IPAQ score comprises attention and externalization disorders, internalization disorders, and externalization disorders.

The Spearman-rho correlation test was employed to examine the association between physical activity and emotional, behavioral, and psychosocial disorders, as the Kolmogorov-Smirnov test failed to detect a normal distribution of the data values. There was no significant correlation between physical activity and emotional, behavioral, or psychosocial disorders, according to the test results (p-values for externalization (0.059), attention (0.322), and total PSC17 score (0.944) were not found to be significant. Conversely, an association between intense physical activity and externalizing behavior was positive, as indicated by an r-squared value of 0.016 (Table 2; Figure 1-4).

Table 1. Demographic characteristics of research respondents.

Parameter	N (%)	Mean (SD)	Med (Min-Max)
Gender			
Male	116 (47,2)		
Female	130 (52,8)		
Grade			
5 th	115 (46,7)		
6 th	131 (53,3)		
Origin of Elementary School			
SDN A	64 (26,0)		
SDN B	39 (15,9)		
SDN C	65 (26,4)		
SDN D	46 (18,7)		
SDN E	32 (13,0)		
Physical activity, IPAQ Score		62,21 (16,45)	58 (37 - 107)
Assess internalizing disorders		4,3 (2,06)	4 (0 - 10)
Assess attention disorders		4,26 (1,68)	4 (0 - 9)
Assess externalizing disorders		3,37 (2,29)	3 (0 - 11)
Pediatric symptom checklist 17 value		11,93 (4,81)	11 (2 - 27)

Table 2. Correlation of physical activity based on the International Physical Activity Questionnaire (IPAQ) with behavioral, emotional, and psychosocial disorders.

Parameter	International Physical Activity Questionnaire (IPAQ)	
Internalizing subscale	Correlation Coefficient	-0.063
	Sig. (2-tailed)	0.322
	N	246
Attention subscale	Correlation Coefficient	-0.042
	Sig. (2-tailed)	0.515
	N	246
Externalizing subscale	Correlation Coefficient	0.121
	Sig. (2-tailed)	0.059
	N	246
Total score of pediatric symptoms checklist-17 (PSC-17)	Correlation Coefficient	0.005
	Sig. (2-tailed)	0.944
	N	246

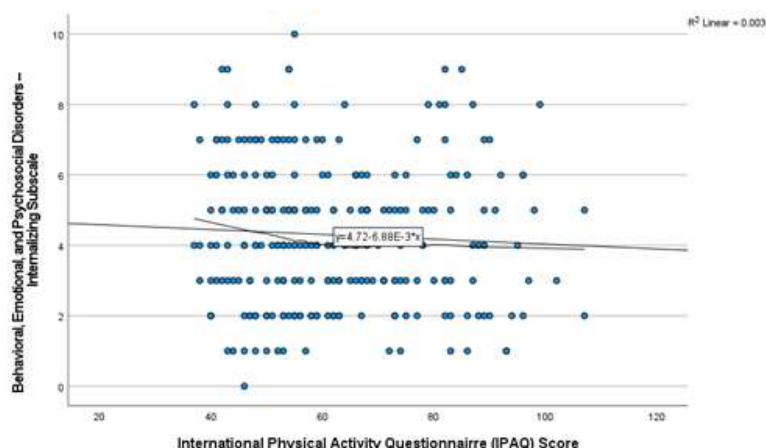


Figure 1. Distribution of the correlation of physical activity with the internalization of behavioral, emotional, and psychosocial disorders subscales.

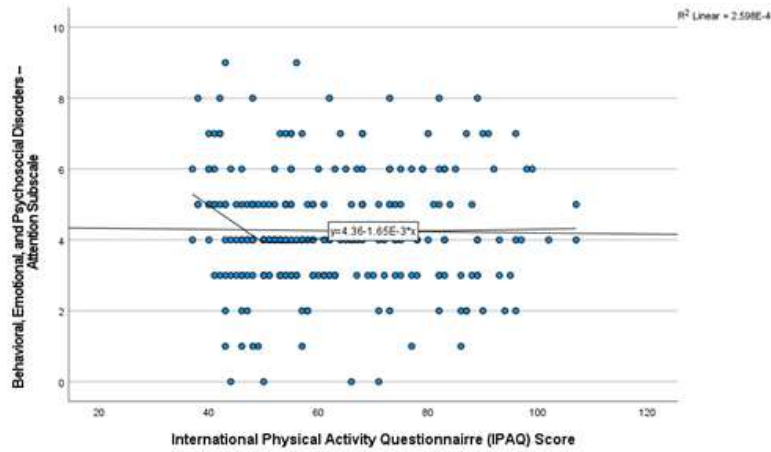


Figure 2. Distribution of correlation of physical activity with attention, behavioral, emotional, and psychosocial disorders subscales.

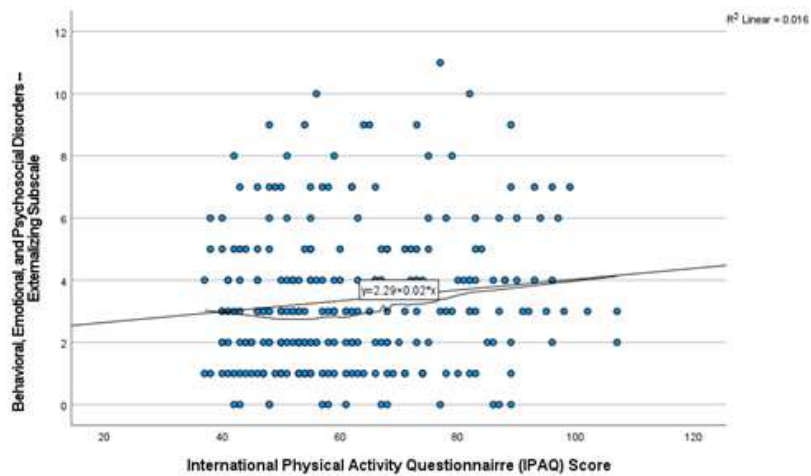


Figure 3. Distribution of the correlation of physical activity with the externalization sub-scale of behavioral, emotional, and psychosocial disorders.

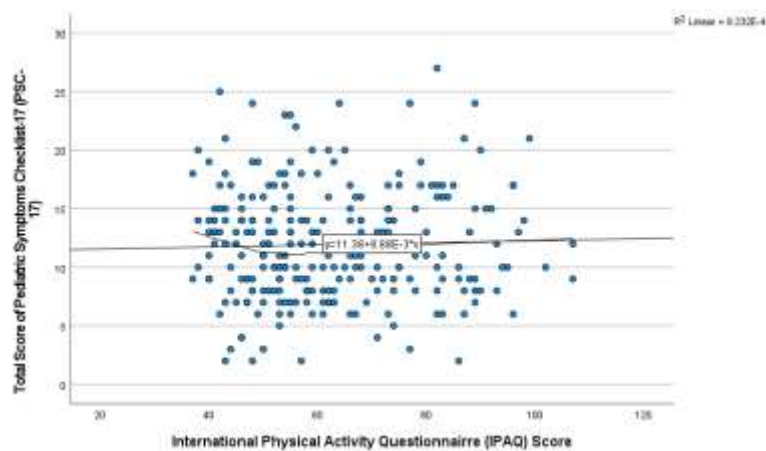


Figure 4. Distribution of correlation of physical activity with behavioral, emotional, and psychosocial disorders (total score from pediatric symptom checklist 17).

Behavioral and emotional issues are increasing among children and adolescents and going unnoticed, that affecting their well-being. There are 11-20% of children in the United States are having behavioral and emotional difficulties. Children who experience these issues frequently face challenges in the form of deficient social contact, strained parent-child interactions, inadequate school readiness, frequent academic difficulties, and health issues during adulthood.^{6,7}

Common behavioral issues in children are attention deficit hyperactivity disorder (ADHD), obsessive-compulsive disorder (OCD), oppositional defiance disorder (ODD), conduct disorder (CD), autism spectrum disorder (ASD), and developmental delays such as speech delays and intellectual disability. Several risk factors, including the economic, have significantly impacted children's emotional and behavioral difficulties. The economy is counted as a primary contributor to these problems. Economic issues contribute to significant social, familial, and environmental pressures that impact psychosocial functioning. In addition to economic factors, maternal melancholy, and negative mood are associated with internal difficulties in children, increasing their vulnerability to developing emotional and behavioral issues. In addition to that, inadequate parenting styles and dysfunctional parent-child relationships can lead to various issues in children.⁷⁻⁹

There is concern about early identification and treatment of mental health problems in children and adolescents. There is currently a lack of comprehensive screening for children's mental health, particularly about emotional and behavioral issues. In addition, conducting screening is challenging due to the lengthy process and insufficient availability of healthcare personnel to perform the screening. The Strengths and Difficulties Questionnaire (SDQ) is a commonly employed measure for assessing mental health in children. This instrument is utilized to assess emotional and behavioral issues in children. This questionnaire has five subsections: emotional symptoms, conduct issues,

hyperactivity/inattention, connection disorders with peers, and social behavior. Conducting emotional and behavioral screening in children is crucial to ensure their healthy development into adulthood.^{10,11}

Physical activity plays a crucial role in the mental health of pediatrics. Evidence suggests that engaging in physical activity can enhance children's cognitive function and physical development. Engaging in outdoor play and exercise courses has been scientifically proven to enhance critical thinking, elevate mood, and increase happiness. Physical activity can increase the size of the brain, by the development of new blood vessels, increase blood flow in the brain, and overall increase in cognitive abilities. Exercise promotes neurogenesis, synaptogenesis, neuronal preservation, and brain-derived neurotrophic factor (BDNF) production, a crucial element for brain development.¹² Sport promotes the development of children's ability to manage both ego behaviour and the group's needs, finding a balance between individual and collective interests. Engaging in sports encourage teamwork among members. It teaches the valuable lesson of embracing both success and failure. Regular exercise enhances blood and oxygen flow to the brain, promotes bone and muscle tissue development, strengthens the immune system, regulates hormone levels, and improves coping with stress.^{13,14}

In addition, involving children in physical activities has been shown to reduce the occurrence of tantrums in preschool-aged children. Interestingly, the outcomes of this study were not influenced by gender, indicating that physical activity positively impacted mental health for both boys and girls. The duration of physical activity varies widely however, most studies suggest that 30-60 minutes of physical activity is most beneficial in promoting good emotional well-being, compared to <30 minutes or >60 minutes. However, further studies are needed.^{4,14}

This study did not find an association between physical activity and emotional and behavioral issues in children. However, it was found that increasing activity led to the occurrence of externalizing behavior.

The exact cause of this cannot be explained with certainty, but it is possible that gender differences in children are related to physical activity. Boys consider physical activity much more important than girls. Girls do physical activity as an act of self-care and weight management. Meanwhile, boys have a strong inclination and preoccupation towards physical exercise and a drive to make friends and engage in friendly competition. This is the factor that enables a connection between internalizing and externalizing behaviours.¹⁵

A study by Lu Yang et al. examined the relationship between physical activity and mental health in 850 children in the Netherlands. The study found that children aged 5-6 years who consistently participated in physical activity had fewer peer problems when they reached 10-11. However, this study revealed that physical activity can serve as a signal of hyperactivity. This study found no correlation between physical activity and emotional and behavioral problems. In this study, those problems are correlated with socioeconomic problems.¹⁶

Based on 14 studies about the impact of physical activity on psychological and behavioral problems in children during the COVID-19 pandemic, it was discovered that there is a significant correlation between physical activity and a decrease in symptoms of depression, anxiety, stress, and unstable mood (OR = 0.677; 95% CI = 0.630, 0.728; p-value <0.001). This relationship also holds for adolescents (OR = 0.650; 95% CI = 0.570, 0.741; p-value <0.001). The decreasing number of physical activity during the COVID-19 pandemic can be attributed to various factors, including social distancing that limits children's ability to engage in physical activities without constraints. Social limitations have a lasting effect on children, causing them to adopt unhealthy lifestyles and develop sedentary habits. Over time, this leads to emotional and behavioral instability.^{3,17}

It is important to acknowledge the various limitations of this research to enhance the credibility and dependability of future studies. An inherent flaw lies in using questionnaires completed solely by

pupils, lacking further verification by teachers or parents. This could introduce bias in research findings, as students may not consistently provide precise evaluations of their physical activity or mental and emotional well-being. Furthermore, cross-sectional study methodologies have constraints in establishing causation between physical activity and behavioral, emotional, and psychosocial illnesses, as they only collect data simultaneously. Additional constraints include the restricted sample size, encompassing solely five primary schools within Ciherang Village. Consequently, this narrow selection may not adequately reflect the broader range of geographical and socioeconomic variations. These limitations emphasize the significance of conducting more extensive research studies in the future. Such studies could include collecting longitudinal data and validation from various sources to enhance our comprehension of the correlation between physical activity and behavioral, emotional, and psychosocial disorders in children.

4. Conclusion

This study examines the relationship between physical activity and emotional and behavioral issues in children, concluding that higher physical activity levels are associated with externalizing symptoms. This study investigates the correlation between physical activity and mental health in youngsters. Researchers anticipate conducting long-term research to explore additional characteristics, including maternal influence, socioeconomic status, and the type and duration of physical exercise. Furthermore, there is an expectation that an accelerometer can be utilized to conduct physical activity assessments, along with doing additional investigations into the specific sorts of physical exercise that impact the mental well-being of youngsters.

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