



Correlation of Physical Activity with Adolescent Mental Health in Early High School

Hanifah Auliya Fatin ¹, Ayu khoirotul Umaroh ^{2 *}

^{1,2} Public Health Study Program, Faculty of Health Sciences, University of Muhammadiyah Surakarta

**Author's Email Correspondence (*): ayu.khoirotul@ums.ac.id,
+62 838-4245-4023**

ABSTRACT

Adolescent mental health is an important issue because it affects emotional, social, and academic development, especially in the early days of high school. Physical activity is known to play a role in maintaining a balance of mental health. This study aims to determine the relationship between physical activity and mental health in early adolescents in one of the high schools in Boyolali Regency. This study uses an analytical quantitative design with a cross sectional approach. The study population was 324 students, with 275 students participating using the total sampling technique. Physical activity was measured using the Global Physical Activity Questionnaire (GPAQ), while mental health was measured using the Depression Anxiety Stress Scales (DASS-42). Data analysis was carried out using the Spearman Rank correlation test. The results showed a significant relationship with the negative direction between physical activity and depression ($p=0.002$; $r=-0.185$), anxiety ($p=0.010$; $r=-0.155$), and stress ($p=0.015$; $r=-0.147$). These findings suggest that the higher the level of physical activity, the lower the rate of mental health disorders in adolescents. In conclusion, physical activity plays a protective factor for adolescent mental health, even though the strength of the relationship found is relatively weak.

Keywords : Physical Activity; Mental Health; Stress; Anxiety; Depression

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INTRODUCTION

Mental health is a condition of well-being that allows a person to cope with the pressures of life, study effectively, work well, and contribute to his or her community. Mental health is an important part of overall health because physical, mental, and social balance allows individuals to live productive lives (1). Common mental health disorders experienced, such as worry, tension, and anxiety when a person faces the pressures of life (2).

According to the World Health Organization (WHO), as many as 20% of the world's population suffers from anxiety and as many as 48% of adolescents often feel anxious. A survey of adolescent mental health in Indonesia in 2022 found that 5.5% of adolescents aged 10-17 years have a mental disorder. The proportion of depression among young people based on education is known to be that 2.2% of junior high school graduates suffer the most from depression (3). The 2023 Indonesian Health Survey (SKI) shows that around 1.7% of the population aged ≥ 15 years in Central Java experience mental health problems. Meanwhile, the prevalence of depression was recorded at 1.0% and 0.18% of adults who had thoughts of ending their lives (4). Based on a survey conducted by Azkiyah & Umaroh (2024) in three high schools in Boyolali Regency, one of the schools showed a high prevalence of anxiety, with 60 students experiencing severe anxiety and 50 students experiencing severe anxiety (5).

Adolescence is known as a transition period of biological, psychological, and social change, so in this phase it is more susceptible to emotional distress that results in mental health problems (6). Mental health problems in adolescents not only affect concentration and academic achievement, but also impact physical condition as well as social and emotional development (7). Mental health disorders do not appear suddenly, but develop from stress experienced by individuals over a certain period of time (8). Situations that trigger emotional discomfort, a less supportive family environment, an unbalanced lifestyle such as lack of physical activity and irregular rest patterns, are

supporting factors for the emergence of mental health disorders (9). This condition can be even more severe if there are limitations in social support, as well as intense exposure to social media (10). Prevention of mental health disorders is an important step in mental health, especially for school-age groups (11). The school environment with peers acts as an interaction space that helps adolescents in emotional control, and forms positive social support (12). Maintaining sleep patterns, doing light physical activity, and participating in mind-calming activities can maintain a person's emotional balance (13).

Low physical activity is one of the factors that cause anxiety in adolescents. Laksmi's research (2023) shows that adolescents with high levels of physical activity have better mental health (14). Physical activity during adolescence has a positive effect on mental health during the transition to adulthood, and is one of the most commonly used strategies to overcome mental health disorders (15).

Previous literature studies have been very rare publications that examine physical activity and mental health in the Boyolali Regency area. Therefore, the purpose of this study is to determine the relationship between physical activity and mental health in early adolescents in high school (SMA X in Boyolali).

METHODS

This study is a quantitative analytical research with a Cross Sectional approach, which aims to analyze the relationship between the independent variable, namely physical activity, and the bound variable, namely mental health, where data collection will be carried out at the same time. This research was carried out on December 4, 2025 which was located at one of the X high schools in Boyolali. The minimum sample count was obtained for a total of 135 respondents. Sampling was carried out using a *total sampling technique*, in which the entire population of 324 students was targeted as respondents. However, only 275 students completed the questionnaire (response rate

of 84.9%), while the remaining participants were excluded due to incomplete or missing responses. Although the sampling frame covered the entire population, the final analysis was based on an exhaustive convenience sample of respondents who completed the questionnaire, and the possibility of non-response bias should be acknowledged as a limitation of this study.

Data collection was carried out using the Global Physical Activity Questionnaire (GPAQ) questionnaire to measure physical activity variables and the Depression Anxiety Stress Scales (DASS-42) questionnaire to assess mental health variables. Both variables use numerical data scales (ratios). The data were analyzed using the Spearman Rank correlation test because the data were not normally distributed. The Spearman Rank correlation test was performed using the total score of each variable (continuous numerical data): total MET-minutes/week for physical activity, and total DASS score for each mental health category (depression, anxiety, and stress).

RESULTS

Table 1. Respondent Characteristics

Features	Frequency (n)	Presentase (%)
Student Age		
15 years	122	4.4
16 years	152	55.3
17 years	1	0.4
Gender		
Men	98	35.6
Women	177	64.4
Participating in Sports Extracurricular (Basketball, futsal, volleyball, pencak silat)		
Yes	85	30.9

No	190	69.1
History of Diseases Affecting Physical Activity (Injury, Respiratory Diseases, Metabolic Diseases)		
Yes	41	14.9
No	234	85.1
History of Mental Health Disorders		
Yes	7	2.5
No	268	97.5
Total	275	100

Based on the table above, the majority of students are in the age group of 16 years (55.3%) followed by the ages of 15 years (44.4%) and 17 years (0.4%). Based on the gender, female students are more than (64.4%), while male respondents are as much as (35.6%). Regarding participation in sports extracurricular activities, most students did not participate in these activities, which was (69.1%). On the characteristics of the history of the disease that affects physical activity, most students do not have a history of the disease with many (85.1%) students. In addition, based on mental health history, almost all students do not have a mental health history, which is (97.5%) students.

Table 2. Frequency Distribution of Physical Activity Levels

Physical Activity Level	Frequency (n)	Presentase (%)
Low	64	23.3
Medium	88	32
High	123	44.7
Total	275	100

Based on the table above, the level of physical activity of students is dominated by the high category, which is 44.7%. Others have a moderate activity level of 32% and

low physical activity of 23.3%. This shows that in general, almost half of the students have implemented a good pattern of physical activity in their daily lives.

Table 3. Mental Health Frequency Distribution

Categories Mental Health	Frequency (n)	Presentase (%)
1. Depression Rate		
Normal	177	64.4
Mild	31	11.3
Moderate	48	17.5
Severe	15	5.5
Extremely severe	4	1.5
2. Anxiety Level		
Normal	67	24.4
Mild	39	14.2
Moderate	75	27.3
Severe	53	19.3
Extremely severe	41	14.9
3. Stress Levels		
Normal	162	58.9
Mild	51	18.5
Moderate	42	15.3
Severe	19	6.9
Extremely severe	1	0.4
Total	275	100

Based on the analysis above, it shows varying characteristics in the three indicators. The level of student depression can be said to be relatively good with the majority of students (64.4%) being in the normal category. The same condition was seen in the stress level, where most students (58.9%) were in the normal category. On the

other hand, the anxiety indicator shows that the majority of students have a moderate anxiety level of 27.3%. This shows that many students of the class experience moderate anxiety.

Table 4. Analysis of the Relationship between Physical Activity and Student Mental Health

variabel	p-value	r (spearman)
Physical Activity – Depression	0.002	-0.185
Physical Activity – Anxiety	0.010	-0.155
Physical Activity – Stress	0.015	-0.147

Based on the table above, the results of the Spearman Rank Correlation test showed a significant relationship with the negative direction between physical activity and depression ($p=0.002$), anxiety ($p=0.010$), and stress ($p=0.015$) in students. The value of the correlation coefficient (r) found ranged from -0.147 to -0.18, which indicates the degree or strength of a weak relationship because it is in the range of 0.00 -0.25, with a negative relationship direction (if the level of physical activity is high, the level of mental disorders is low and vice versa).

DISCUSSION

This study shows that there is a relationship between physical activity and mental health in adolescents, with weak relationship strength. When physical activity is high, the rate of mental disorders is low and vice versa. The results of this study are in line with research conducted by McMahon et al (2017) showing that physical activity with a negative association with symptoms of depression and anxiety in adolescents shows that an increase in the frequency of physical activity is related to a decrease in depression and anxiety scores. The study also found that physical activity was positively associated with mental health (16). These results are reinforced by research by Kandola

et al (2020) which showed that an increase in light physical activity and total physical activity is related to a decrease in depressive symptoms in late adolescence. Although the strength of the relationship found is relatively weak (17).

Physical activity is scientifically proven to be a positive physiological stressor that is able to increase the resilience of the autonomic nervous system while mitigating the axial reactivity of the Hypothalamic-Pituitary-Adrenal (HPA) in suppressing the excess production of the hormone cortisol. Regular physical activity triggers the brain's response through the release of *essential neurotransmitters* such as *serotonin*, *dopamine*, and *norepinephrine* that play a direct role in improving mood and emotions (18). Although biologically there is a strong relationship, the limited strength of statistical relationships in studies in the student population shows that adolescent mental health is a multifactorial phenomenon that is not influenced by only one variable. Other factors that can affect such as the individual's neurobiological condition, psychosocial factors, and sedentary behavior (19).

Physical activity has a positive impact on adolescent mental health. Involvement in physical activity helps distract from academic stress and everyday problems, thus providing space for mental recovery and more adaptive stress processing (20). Not only that, physical activity plays a role in forming a positive self-perception. Being active in physical activity can increase confidence, feelings of accomplishment, and self-satisfaction, which are important components of maintaining adolescent mental health (21). Physical activity also provides behavioral benefits, where adolescents who are physically active tend to have a more structured and balanced daily routine. Where a regular pattern of activities makes adolescents manage time, reduce sedentary behavior, and balance between academic activities and rest time (22).

Physical activities that are done together also have a strong social meaning for adolescents. Interaction with peers during physical activity strengthens social support, a sense of community, and social acceptance, which play an important role in preventing

feelings of loneliness and isolation (23). In the context of schools, physical activity is a relevant means to support a more supportive environment for mental health. Through physical activities at school, adolescents have the space to express themselves positively, build healthy social relationships, and develop emotional skills that support mental health in the long run (24).

The effectiveness of physical activity in the context of adolescent mental health is influenced by how it is managed and integrated into daily routines. Physical activity is carried out regularly with a consistent frequency that is effective in managing mental health disorders (25). Physical activity is recommended to be done regularly for about 150 minutes/week in the treatment and prevention of mental health disorders (26). In addition, a frequency of at least 1-2 times/week is also considered relevant in maintaining mental health (27). In managing physical activity, it is also necessary to pay attention to the type of physical activity that suits the preferences, health conditions, and context of adolescent life, so that it does not depend solely on high-intensity sports (20). Physical activity management in adolescents must also consider the implementation environment, which is to create safe and enjoyable conditions. Such as in schools or community groups, so that individuals get social support that facilitates regular exercise in daily life (23).

In addition to physical activity, mental health is also influenced by various other factors that were not studied in this study, such as family environment, social support, and academic pressure (28). Less supportive family and school environments can increase the risk of mental health problems, while social support plays a protective role against mental health (29). In addition, poorly managed academic stress is also evident with a decline in mental health (30).

CONCLUSIONS AND RECOMMENDATIONS

This study showed a significant association with negative directions between physical activity and mental health in early adolescents in high school, where higher levels of physical activity were associated with lower rates of depression, anxiety, and stress. Although the strength of relationships is relatively weak, these findings confirm the role of physical activity as a protective factor in supporting adolescents' mental health in the early stages of school adaptation. Therefore, schools are advised to encourage increased physical activity through sports programs and structured physical activities as part of mental health promotive and preventive efforts. Further research is recommended to consider other factors that affect adolescent mental health and use a more comprehensive research design to reinforce the findings.

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