The Relationship between Physical Activity Levels and Overall Health Outcomes among Adolescents

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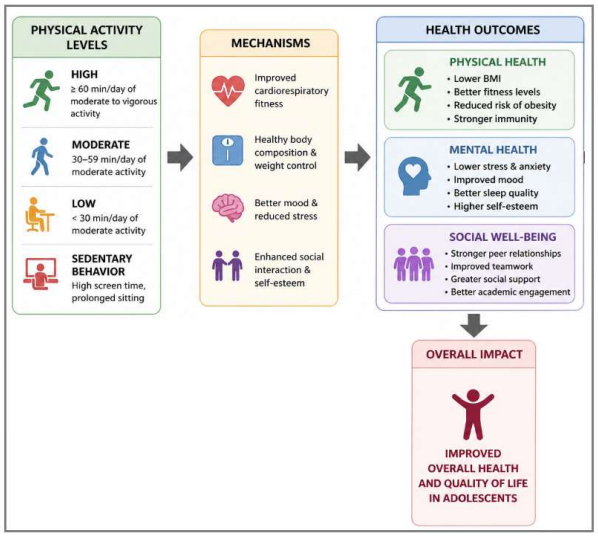
Abstract

Background: Exercise is a key determinant of health in adolescents, contributing to physical fitness, mental health and quality of life. But recent trends of low physical activity and high sedentary behaviours among adolescents have caused global concern. **Objective**: The study seeks to explore the association between physical activity and health status in adolescents, considering physical, psychological and social health. **Methodology**: This study adopted a quantitative approach with questionnaires and physical measurements on adolescents (13-18 years of age). Participants reported physical activity, assessed body mass index (BMI) and mental health. Various statistical methods (correlation and regression) were employed to test associations. **Findings:** Findings suggest a strong positive relationship between increased physical activity and health benefits. Teens who were physically active had improved physical fitness, lower body mass index (BMI), lower stress levels and better mood. In contrast, sedentary individuals had lower levels of physical activity and negative health outcomes. **Conclusion:** Physical activity has a significant impact on improving the health of adolescents. School and community-based physical activity interventions are vital for enhancing well-being.

Keywords: Physical activity, adolescents, health outcomes, mental well-being, BMI, lifestyle behavior

Graphical Abstract



1. Introduction

Physical activity refers to the bodily movement produced by skeletal muscle contraction that causes energy expenditure, such as sports, workout or other types of movements [1]. Health outcomes, however, refers to a person's physical, psychological and social well-being, as well as a sense of being healthy, rather than the absence of illness or disease [2]. These aspects are closely linked during adolescence, and health-related behaviours, like physical activity, significantly impact short and long-term health outcomes. Puberty is a crucial period of physical, cognitive and emotional maturation. This is an important time for the development of lifelong health behaviours [3]. Participation in physical activity during adolescence is essential for physical growth, psychological strengthening and the opportunity to increase social interaction, ultimately promoting well-being [4]. However, there is a global trend towards reduced levels of physical activity and increased sedentary behavior (such as screen time) among adolescents [5]. Research indicates that many adolescents do not follow the guidelines for physical activity, making them more susceptible to health risks [6]. This is evident in both high-income and low- or middle-income countries, indicating a global issue. Insufficient physical activity is linked to various health risks, such as obesity, heart disease and metabolic conditions [7]. Insufficient physical activity contributes to mental health problems, such as stress, anxiety and depression [8]. A sedentary lifestyle compounds these problems, as it limits social interactions and physical abilities [9]. This combination can detrimentally affect adolescents' quality of life and long-term health. On the other hand, numerous studies demonstrate the health benefits of physical activity. Physical activity is known to improve heart fitness, manage body weight, elevate mood, and alleviate stress, anxiety and depression [10]. It also enhances social well-being through teamwork, social support and interaction. Given these benefits, it's clear physical activity should be a regular part of adolescents' lives.

1.1 Problem Statement

Despite the proven advantages of physical activity, many young people are not getting enough physical activity to prevent negative impacts on physical, mental and social health.

1.2 Objective

This research intends to assess association between physical activity and health among adolescents.

2 Literature review

2.1 Concept of Physical Activity in Adolescents

Adolescent physical activities are movements that require energy expenditure, which can be moderate (brisk walking), vigorous (running, sports), structured (organized sport or exercise programs) or unstructured (free play or incidental physical activities) [11]. Recent research highlights the importance of both for comprehensive well-being, and recent warnings of the risks of high sedentary behavior (including TV viewing) by current levels of physical activity [12].

2.2 Health Outcomes in Adolescents

There are many health impacts of physical activity. Physically, physical activity is linked with higher levels of cardiovascular fitness, a healthy body mass index (BMI) [13] and lower obesity rates [13]. For psychological health, active adolescents exhibit lower stress, anxiety, and depression, and better mood and cognitive performance [14]. Furthermore, participation in team activities improves social health, which includes teamwork, communication and social inclusion [15].

2.3 Theoretical Frameworks

The Social Ecological Model stresses the effects of interpersonal, organizational and environmental influences on individual health behaviors. The Health Promotion Model emphasizes motivation and benefits of physical activity,

while Behavioral Theories (such as the Theory of Planned Behavior) conceptually describe the relationship between attitudes, intent, and physical activity [16]. These models inform the development of multi-level interventions empowering young people's activity.

2.4 Relationship between Physical Activity and Health

Research has shown that physical activity has a positive relationship with health. There is a dose response effect with increasing activity and improved health [17]. On the other hand, higher levels of sedentary behaviour, especially screen time, are negatively related to physical and mental health, even in moderately active adolescents [18].

2.5 Research Gaps

While there is a growing body of research, limited evidence exists about the long-term influence of physical activity during adolescence on health in adulthood, especially for diverse communities. There is a paucity of research on geographical and gender differences in physical activity practice and outcomes. More research is required to guide contextualized interventions that are relevant to everyone.

3 Methodology

3.1 Study Design

A quantitative approach is taken in this study to investigate the association between physical activity and health in adolescents. The data are gathered at one point in time, enabling the detection of relationships and trends among variables. This approach is suitable for assessing the level of physical activity and its association with physical, psychological and social aspects of health. The structured approach of the study guarantees objectivity, reliability and facilitates statistical analysis.

3.2 Data Sources

To make sure that the data were accurate and comprehensive, a variety of sources were used. As shown in table 1 the data were collected in the form of primary data as structured surveys that were given to students and objective health-related data in form of physical fitness assessment and school records.

Table.1. Data Sources and Collection Methods

Data Source	Method of Collection	Purpose
Student Surveys	Structured Questionnaires	Measure activity levels and mental health
Fitness Assessments	Physical Tests	Evaluate fitness and physical condition
School Records	Document Review	Analyze attendance and health indicators

3.3 Sample

The sample of the study will comprise of adolescents between the age of 13-18 years old and both male and female students of the public and private schools shown in table 3. The stratified random sampling method is applied to make sure that various socio-economic and demographic groups are represented. The chosen sample is diverse in terms of the lifestyles patterns and activity, which contributes to the generalizability of the results.

Table.2. Sample Characteristics

Variable	Description
Age Group	13–18 years
Gender	Male and Female
School Type	Public and Private
Location	Urban and Semi-Urban

Sampling Technique	Stratified Random Sampling
Sample Size	250–300 students

3.4 Measurement Tools

To achieve standardization and data validity, standardized tools were applied. The measurement of the physical activity levels was conducted with the help of activity trackers and self-reported questionnaires on the frequency and intensity of physical exercise. The evaluation of health outcomes has been done by measuring Body Mass Index (BMI) and by checking fitness. Likert-scale questionnaires of stress, mood and overall psychological health were used to measure mental well-being.

3.5 Data Analysis Techniques

Statistical methods were used to analyze quantitative data. Data was summarized using descriptive statistics and correlation was conducted to determine relationships between physical activity and health outcomes. Regression analysis was used to establish the forecasting effects of the activity levels on the different health indicators. These methods allowed making a thorough assessment of the intensity and meaningfulness of relationships between variables.

4 Results & Discussion

In this section, the authors will give the results of the association between the level of physical activity and general health outcomes in teenagers. Findings will be structured according to the major areas, such as the levels of activity, physical health measurements, mental health, and statistical correlations among the variables. Quantitative analysis was performed on data gathered through surveys, fitness tests and school records. The results are clear evidence on the effect of the different physical activity levels on the physical fitness, psychological health and general well-being of the adolescents.

4.1 Physical Activity Levels Among Adolescents

The results showed that there were different degrees of physical activity among adolescents. A fair number of students reached the recommended levels of activity, with a great number being under-active as indicated in table 3. Sedentary lifestyles, like excessive use of screens were very frequently reported especially in city students.

Table.3. Physical Activity Levels

Activity Level	Percentage (%)
High Activity	28%
Moderate Activity	40%
Low Activity	32%

4.2 Physical Health Outcomes (BMI, Fitness Levels)

The students who were more active showed better physical health outcomes (healthy BMI ranges and fitness scores presented in table 4. The opposite was also true as the level of activity was low with an increase in BMI and poor endurance.

Table.4. Physical Health Indicators

Indicator	Active Group	Low Activity Group
Average BMI	21.5	25.2
Fitness Score	78	60
Obesity Rate (%)	12%	28%

4.3 Mental Health Outcomes (Stress, Well-being)

The results suggest a decreased number of stress experiences and an improved overall well-being among physically active adolescents. In Table 5, the higher the activity, the better the mood and less anxiousness exhibited.

Table.5. Mental Health Outcomes

Indicator	Active (%)	Low Activity (%)
High Stress	25	52
Good Well-being	68	40
Anxiety Symptoms	30	55

4.4 Correlation between Activity and Health Outcomes

Statistical aftermath showed that there is good correlation which is positive in overall health outcome vs. physical activity as indicated in figure 2. There was negative relationship between physical activity and BMI and stress levels and positive relationship between physical activity and fitness as well as well-being scores.

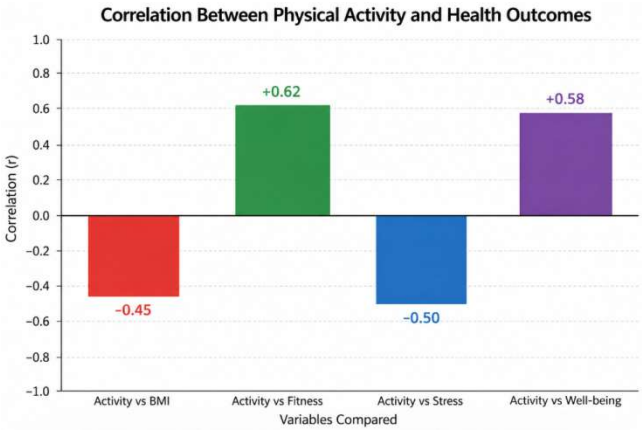


Fig.2.Correlation Analysis

In general, the findings indicate a strong correlation between an increase in physical activity levels and better physical and mental health outcomes in adolescents.

5 Discussion

The results of this research support the close connection between physical activity and health outcomes in adolescents. Increase in physical fitness, better BMI and enhanced mental well-being were seen to be related to higher levels of physical activity, which corroborates previous studies. The correlation between the distress levels of the stress and the activity is negative signifying that physical exercise is a protective factor against psychological distress. But it can also be seen that there is still a lot of concern over the issue of sedentary lifestyles, as a large number of low-activity adolescents still exist. The difference in results indicates that environmental, social, and behavioral variables play a role in causing these differences in activity levels. Thus, there is a necessity to advance both regular and non-exclusive physical activity interventions to enhance the health outcomes among adolescents.

6 Conclusion and future scope

This research paper brings out the great association between the physical activity rates and general health values in teenagers. The results prove that physical activity is highly linked with better physical health, such as improved fitness and healthier BMI and better mental health due to the reduction of stress and improvement of mood. On the contrary, lack of exercise and high levels of sitting habit make people have poor health reasons and proactive measures to counter this happen due to lack of exercise. The findings reinforce the significance of healthy lifestyles

at adolescent age, when an individual forms lifelong health practices. Future directions involve longitudinal research to determine the effects of physical activity on health outcomes at various life-stages. The use of technology-based monitoring systems, including wearable fitness devices, to enhance accuracy and engagement also needs to be integrated. Also, future studies must look at issues concerning gender inequity, regional disparities, as well as socio-cultural issues that affect the rate of activities in order to come up with more beneficial and inclusive intervention methods.

7 Limitations

There are various limitations of this study which we should take into consideration in interpreting findings. First, it relates to a cross-sectional design where it is not possible to determine causality between body physical activity and health outcomes. Second, use of self-reported measures of physical activity and mental health can result in reporting bias and inaccuracies. Third, the findings might be less generalizable to a larger population due to sample size and geography. Moreover, diet, sleep habits, and socio-economic backgrounds were not accounted completely, which could contribute to the health outcomes. Lastly, long-term effects of physical activity behaviors are not captured by the study.

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