



PR1: Importance of physical activity and its monitoring

Introduction

Physical activity is crucial for the population for several reasons, particularly in terms of physical, mental, and social health. Regular physical activity helps prevent chronic diseases such as cardiovascular disease, type 2 diabetes, obesity, and certain types of cancer. It strengthens the immune system, reducing the risk of infections, and supports the health of the musculoskeletal system, preventing conditions like osteoporosis, arthritis, and other bone and joint problems. Additionally, physical activity plays a key role in maintaining a healthy body weight and achieving energy balance.

Beyond physical benefits, physical activity significantly impacts mental health. It helps reduce stress and anxiety by increasing the production of endorphins, which improve mood. Regular exercise can also lower the risk of depression and enhance cognitive functions such as memory and concentration, contributing to overall mental well-being. The social benefits of physical activity are equally important. Shared sports or physical activities foster the development of interpersonal relationships and social bonds. These activities also promote inclusion by bringing people together regardless of age, gender, or social background.

There are notable economic advantages as well. A healthier population requires less spending on healthcare, reducing the burden on healthcare systems. Moreover, physically active individuals tend to have higher workplace productivity and fewer sick days, which positively impacts the economy. Physical activity improves the quality of life. It contributes to greater overall satisfaction, boosts self-confidence, and helps individuals manage daily tasks more effectively. An active lifestyle not only extends life expectancy but also enhances its quality, making it an essential component of a healthy and harmonious life for both individuals and society as a whole.





Impact of physical activity on health

A lack of physical activity has far-reaching and serious consequences for physical, mental, and social health, as well as for the overall quality of life of individuals and society. On a physical level, insufficient physical activity significantly increases the risk of chronic diseases such as cardiovascular diseases, type 2 diabetes, high blood pressure, obesity, and certain types of cancer, including colon and breast cancer. It weakens the musculoskeletal system, leading to reduced muscle mass, bone density, and joint flexibility. This increases the likelihood of developing conditions like osteoporosis, arthritis, and musculoskeletal injuries, particularly in older adults.

Furthermore, a sedentary lifestyle negatively impacts metabolism, contributing to insulin resistance, poor blood sugar regulation, and increased cholesterol levels, which further elevate the risk of cardiovascular and metabolic disorders. In addition to these physical consequences, a lack of physical activity severely impacts mental health. It is strongly associated with higher rates of depression, anxiety, and chronic stress, as physical inactivity reduces the production of endorphins—natural chemicals in the brain that enhance mood and promote feelings of well-being. The absence of regular exercise can also impair cognitive functions such as memory, focus, and problem-solving abilities. Over time, this increases the risk of neurodegenerative conditions like dementia and Alzheimer's disease, particularly in aging populations.

Poor mental health resulting from inactivity can lead to a vicious cycle, where individuals feel less motivated to engage in physical activity, further worsening their emotional and cognitive state. Socially, the consequences of a sedentary lifestyle are equally concerning. Physical inactivity often leads to greater social isolation, as people miss opportunities to engage in group activities, sports, or community events that foster social connections. This can result in weaker interpersonal relationships, a diminished sense of belonging, and an increased risk of loneliness and social anxiety. In addition, a lack of participation in physical activities can exacerbate societal divisions, as it limits opportunities for people from different backgrounds to interact and build relationships.

The economic impact of insufficient physical activity is substantial. Chronic diseases and health complications related to inactivity result in significantly higher healthcare costs, placing a heavy financial burden on individuals, families, and healthcare systems. Additionally, physically inactive individuals are more likely to experience reduced workplace productivity due to frequent illnesses, fatigue, and a lack of energy. This leads to increased absenteeism,





lower job performance, and, ultimately, a negative effect on economic growth and workforce efficiency. The decline in the quality of life is another major consequence of a sedentary lifestyle. Physically inactive individuals often experience persistent fatigue, lower energy levels, and reduced overall vitality, making it difficult to carry out daily tasks and responsibilities. This can contribute to feelings of frustration, dissatisfaction, and a diminished sense of personal achievement.

Over time, this negatively impacts self-esteem and self-confidence, as individuals may feel less capable or less in control of their physical and mental well-being. Moreover, a sedentary lifestyle is closely linked to a shorter lifespan and higher mortality rates, as it increases the risk of life-threatening conditions such as heart attacks, strokes, and certain cancers. In a broader societal context, widespread physical inactivity undermines public health and places a strain on national resources, including healthcare systems and economic productivity. It also exacerbates health disparities, as lower-income populations often have less access to safe and affordable opportunities for physical activity. Addressing this issue requires a multifaceted approach, including public health campaigns, policies to promote active living, and the creation of environments that encourage regular physical activity, such as safe walking paths, parks, and recreational facilities.

the lack of physical activity has complex and far-reaching consequences that negatively impact health, social relationships, economic stability, and overall quality of life. It is essential to raise awareness of these risks and to promote regular physical activity as an integral component of a healthy lifestyle. By encouraging an active lifestyle, we can improve not only individual well-being but also the health and prosperity of society as a whole.



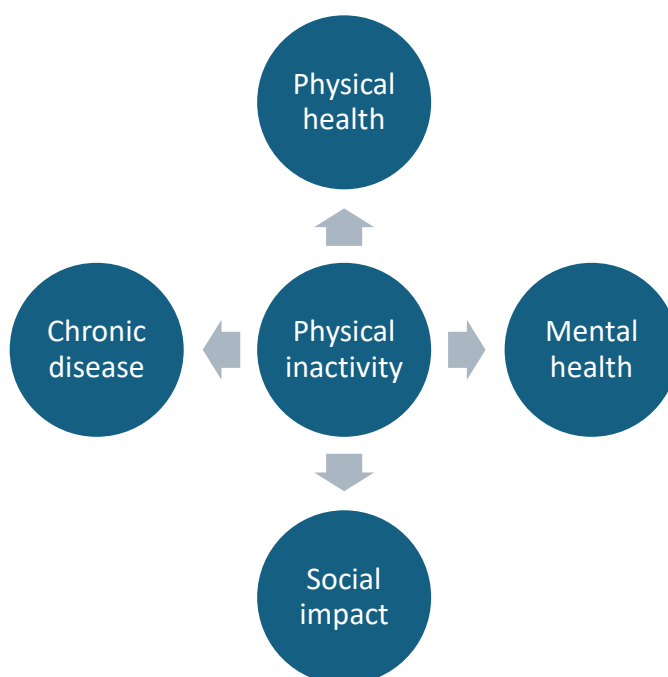


Figure 1 Impact of physical activity

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Need to monitor physical activity in population

Monitoring the level of physical activity in practice is crucial for effectively addressing the widespread problem of sedentary lifestyles and their associated health risks. By tracking physical activity levels, individuals, healthcare professionals, and policymakers can identify patterns, assess risks, and implement targeted interventions to promote healthier lifestyles and prevent chronic diseases. Monitoring helps identify specific populations or individuals at higher risk of health complications due to inactivity, such as older adults, people with sedentary jobs, or those with limited access to recreational spaces. This data allows for tailored health education and support programs. Regular assessment of physical activity also enables healthcare providers to evaluate a patient's risk for chronic conditions like cardiovascular diseases, obesity, and diabetes. By using tools such as step counts, heart rate data, or activity logs, professionals can provide personalized health plans and encourage early intervention. Furthermore, monitoring is an essential part of preventive healthcare. Tracking activity levels over time helps individuals and healthcare professionals recognize trends and make adjustments before serious health problems develop. This proactive approach reduces the burden on healthcare systems and enhances population health. In practice, it also allows for the evaluation of intervention effectiveness. By measuring activity levels before and after initiatives such as community fitness programs or workplace wellness schemes, stakeholders can determine which strategies work best and refine them for greater impact. On an individual level, tracking physical activity can serve as a motivational tool. Wearable devices, mobile apps, and activity logs help people set goals, monitor their progress, and stay accountable, reinforcing healthy habits and encouraging regular movement. On a broader scale, data on physical activity informs public health policies and resource allocation. Governments and organizations can use this information to invest in infrastructure like parks, bike lanes, and recreational facilities, particularly in areas where activity levels are low. Additionally, it guides the design of public health campaigns aimed at promoting active commuting or reducing screen time.

Population-level monitoring provides critical insights into public health trends, helping to identify the root causes of inactivity whether environmental, cultural, or socio-economic—and supporting the development of comprehensive strategies to improve overall health outcomes. In conclusion, systematic monitoring of physical activity is essential to combat the growing epidemic of sedentary behavior. By tracking activity levels, we can promote healthier lifestyles, reduce the prevalence of chronic diseases, and enhance the quality of life for individuals and





communities. This proactive approach benefits personal health while fostering a healthier, more active society.

The International Physical Activity Questionnaire (IPAQ)

IPAQ is a standardized tool widely used for assessing the level of physical activity in adults. It was developed to enable the comparison of physical activity levels across different countries and cultures and is commonly utilized in both research and public health practice. The IPAQ is designed for adults aged 15 to 69 years and is available in two formats: a short form consisting of 7 questions for quick assessment of overall physical activity levels over the past week, and a long form with more detailed questions to analyze specific types of physical activities, such as those related to work, transportation, household tasks, and leisure time. The questionnaire evaluates four main domains of physical activity: Walking, which includes time spent walking during various activities. Moderate-intensity physical activity, such as brisk walking or light dancing, which increases breathing and heart rate but allows conversation. Vigorous-intensity physical activity, such as running or aerobics, which significantly elevates breathing and heart rate. Sedentary behavior, including time spent sitting during work, reading, or watching television. Based on the responses, the IPAQ calculates the total level of physical activity in MET (Metabolic Equivalent of Task) units, categorizing individuals into three levels: Highly active, meeting or exceeding recommended physical activity levels. Moderately active, achieving the minimum recommended amount of physical activity. Low active, not engaging in sufficient physical activity to maintain good health. The IPAQ offers several advantages, including its standardization, which facilitates international comparisons, and its simplicity, making it quick and easy to administer. It has broad applications, from clinical assessments to large-scale epidemiological studies.

However, it also has limitations, such as its reliance on self-reported data, which can lead to biased results, and the need for clear instructions to ensure accurate responses. In conclusion, the IPAQ is an effective tool for measuring physical activity levels, aiding in the evaluation, planning, and monitoring of strategies to improve population physical activity. Its standardization ensures reliability and enables meaningful international comparisons.

Cross sectional study

This cross-sectional prospective study will be conducted via an anonymous online survey aimed at assessing various aspects of physical activity, health behaviors, or other relevant factors





among university students. The study will be carried out on students from universities in three different countries, providing a diverse sample that allows for the comparison of results across cultural, educational, and social contexts. By including participants from multiple nations, the research aims to capture broader trends and identify potential regional or country-specific patterns in the examined variables.

The study will be randomly distributed through social media platforms and electronic learning systems to ensure wide and diverse reach among the target population. A link to a Google Form questionnaire will be shared, allowing students to access and complete the survey conveniently. Only undergraduate and graduate students aged 17 to 30 years, who are native to their respective countries, will be eligible to participate. This eligibility criterion will ensure that the data collected is representative of the student populations within each country. By leveraging online platforms, the study aims to maximize participation and gather a robust dataset that can be used for meaningful analysis and comparison across the three countries. To maintain accuracy and reliability, clear instructions will be provided to participants regarding the completion of the survey, and data will be anonymized to ensure confidentiality.

Impact of the study

The impact of this study lies in its potential to provide valuable insights into the physical activity levels, health behaviors, and lifestyle patterns of university students across three different countries. By comparing data from diverse cultural and social contexts, the study will contribute to a better understanding of regional and international differences in students' habits and their associated health outcomes.

This research has the potential to raise public health awareness by highlighting the current state of physical activity and health-related behaviors among university students, a demographic often at risk of adopting sedentary lifestyles. The findings can inform policymakers and educational institutions about the need for targeted interventions, such as incorporating physical activity programs into university curricula, creating supportive environments, or implementing public health campaigns tailored to students' needs. By examining students from three different countries, the study provides a cross-cultural perspective, identifying cultural or environmental factors that influence health behaviors and guiding the development of culturally sensitive health promotion strategies.

Additionally, the study will contribute to academic research by enriching the existing body of literature on physical activity and health behaviors in young adults, particularly university





The movement activity enhancement after the COVID19 pandemics (COVIDMOVE)

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students, and offering new data that future researchers can build upon. It will also help identify gaps in the current research and open avenues for further studies. Insights from this study can aid in developing preventive strategies aimed at reducing the risk of chronic diseases associated with physical inactivity and unhealthy behaviors, thereby improving long-term health outcomes for this population.

Universities can also benefit from the study's findings by implementing or improving wellness programs, providing better access to recreational facilities, and fostering a campus culture that prioritizes student health and well-being. Overall, the study's impact will extend beyond academia, influencing public health practices, education policies, and the well-being of university students. By addressing the specific needs of this demographic, the research has the potential to create lasting positive changes at both individual and societal levels.



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