

Medical Science

To Cite:

Frączek A, Juszczak A, Kaptur G, Mierzwa A, Pietrajtis S, Wrona A, Rosołowska K, Lelek M, Kaczmarek K. Physical Activity and Cardiovascular Disease: Impact on Cardiovascular Health and Prevention. *Medical Science* 2026; 30: e196ms3987
doi: <https://doi.org/10.54905/disssi.v30i175.e196ms3987>

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Peer-Review History

Received: 27 June 2026

Reviewed & Revised: 16/July/2026 to 09/September/2026

Accepted: 18 September 2026

Published: 29 September 2026

Peer-review Method

External peer-review was done through double-blind method.

Medical Science

pISSN 2321-7359; eISSN 2321-7367



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Physical Activity and Cardiovascular Disease: Impact on Cardiovascular Health and Prevention

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ABSTRACT

Background: In recent years, there has been an increase in the number of cardiovascular events, highlighting the importance of effective strategies for cardiovascular disease (CVD) prevention. Physical activity (PA) is well known as a protective factor against cardiovascular disease and is one of the most important modifiable factors linked to cardiovascular health. It has been linked to beneficial effects on a number of cardiovascular risk factors and may therefore help to reduce both cardiovascular morbidity and mortality. **Objective:** The aim of this narrative review was to summarize the main cardiovascular effects of physical activity and to assess its role in the prevention and in the management of cardiovascular disease, with a particular focus on its impact on the modifiable cardiovascular risk factors. **Methods:** A narrative literature review was carried out using the PubMed database. The search included articles in English published from 2018 to 2026. **Results:** Regular physical activity has beneficial effects on cardiovascular health. These include improvements in cardiorespiratory fitness, blood pressure, metabolic function, body composition, and other modifiable cardiovascular risk factors. Higher levels of habitual PA are associated with a lower risk of CVD and cardiovascular events, whereas physical inactivity and sedentary behavior are associated with an unfavorable cardiovascular risk profile. **Conclusions:** PA is an important determinant of cardiovascular health. Its promotion should form an integral part of strategies for prevention of CVD. Increasing habitual physical activity and reducing sedentary behavior may lead to more favorable cardiovascular risk profiles and better long-term cardiovascular outcomes.

Keywords: physical activity, cardiovascular disease, risk factors, prevention, exercise

1. INTRODUCTION

Cardiovascular disease (CVD) remains the leading cause of morbidity and mortality worldwide and represents a major global public health challenge. Although several

cardiovascular risk factors are non-modifiable, lifestyle behaviors play an important role in the prevention and management of CVD. Among these, physical activity (PA) is one of the most important modifiable factors associated with cardiovascular health (Naoum and Marques-Vidal, 2025).

Physical activity has a number of beneficial effects on various cardiovascular and metabolic risk factors, such as body composition, blood pressure, lipid levels, glucose metabolism, and cardiorespiratory fitness. The greater the amount of physical activity, the lower the risk of developing cardiovascular disease, while physical inactivity and a sedentary lifestyle lead to an increased risk of cardiovascular events and early death. Significantly, increasing physical activity can offer considerable advantages for people who already have cardiovascular risk factors and for those who have a diagnosed cardiovascular disease (Söderström et al., 2025).

The majority of the studies that examined the relationship between physical activity and cardiovascular disease concluded that increased activity results in greater benefits. Yet the magnitude of this effect differed from study to study, and this might be due to the fact that the studies used different kinds, intensities, and methods of measuring physical activity (Gower et al., 2024).

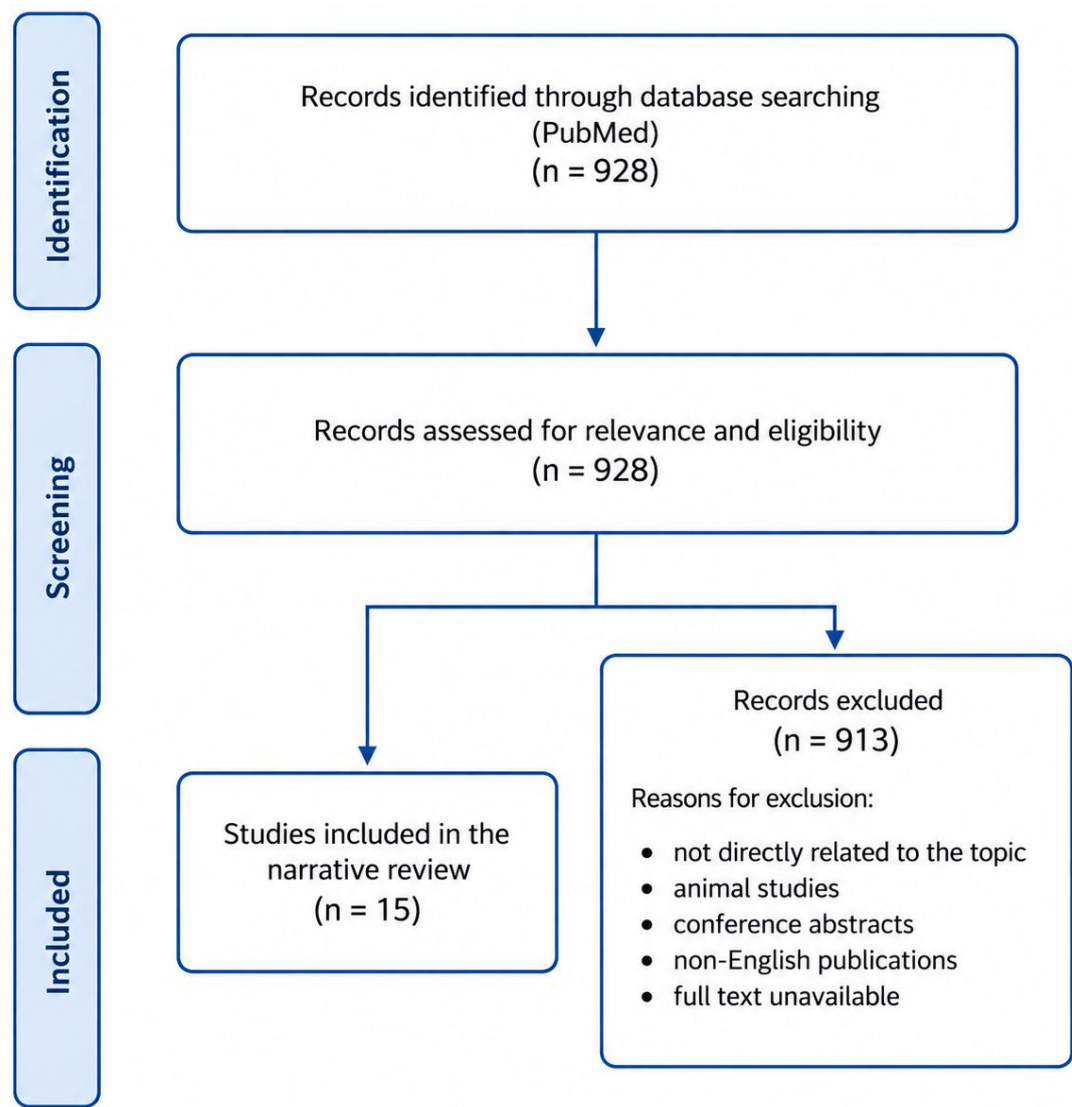


Figure 1. Flow diagram of the literature search and study selection process.

Physical activity tends to decrease as people get older, which may lead to a build-up of cardiovascular risk factors and a higher risk of disease. On the other hand, keeping up one's level of physical activity or even increasing it during adulthood and older age can help to promote heart health and enhance general physical function. For people who have cardiovascular disease, physical activity that has been properly prescribed can also lead to an improvement in exercise capacity, in quality of life, and in long-term clinical outcomes (Feldman et al., 2018).

The current guidelines suggest that people should engage in at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic physical activity each week in order to maintain good cardiovascular health. Yet the association between physical activity and cardiovascular disease is affected by various factors, including the intensity, duration, frequency of the activity, age, and an individual's general health condition. It is therefore essential to understand the role of physical activity in the prevention and management of cardiovascular disease if effective strategies are to be developed for reducing cardiovascular risk and improving overall population health (Mu et al., 2021).

2. REVIEW METHODS

A narrative literature review was conducted using the PubMed database, with the search covering English-language articles published between January 2018 and May 2026. The keywords used were physical activity, cardiovascular disease, risk factors, prevention, exercise, as well as their combinations. Only original research articles, systematic reviews, clinical trials, and meta-analyses that were concerned with physical activity in cardiovascular disease were included. The studies were chosen based on their relevance to the subject and their methodological quality. Articles published in languages other than English, animal studies, conference abstracts, and articles without full-text access were excluded. The literature search and study selection process is presented in Figure 1.

3. RESULTS AND DISCUSSION

Physical Activity Behaviors and Impact of Physical Activity on Cardiovascular Health

The evidence currently available shows a consistent link between physical activity and cardiovascular health. This kind of physical activity includes a wide variety of movements carried out in everyday life, such as those done at work, for recreation, as part of traveling, and also includes structured exercise. On the other hand, sedentary behavior is defined as sitting or lying down with very low energy expenditure and is an independent behavioral risk factor for cardiovascular disease (CVD).

Higher levels of sedentary behavior were consistently linked to an increased risk of CVD, diabetes, obesity, and premature death. Moreover, even when moderate-to-vigorous physical activity (MVPA) was taken into account, a longer duration of sedentary behavior was linked to a greater risk of cardiovascular events and of death from CVD. It has also been shown that substituting sedentary time with MVPA led to improvements in a number of cardiometabolic risk factors, such as body mass index, waist circumference, high-density lipoprotein cholesterol, fasting glucose, and fasting insulin. Furthermore, replacing sedentary behavior with standing or with light-intensity physical activity was associated with a lower risk of death from CVD, especially in those who reported more than six hours of sedentary time each day.

Greater daily physical activity was also linked to more favorable cardiovascular risk profiles. Studies based on populations have found an association between higher levels of daily activity and a healthier waist circumference, higher levels of high-density lipoprotein cholesterol, lower triglyceride levels, as well as a reduced risk of cardiovascular events and deaths from cardiovascular disease. Furthermore, structured exercise was connected with beneficial physiological adaptations relating to blood pressure, lipid metabolism, coagulation, fibrinolysis, and vascular remodeling (Hannan et al., 2021).

The evidence as a whole indicates that physical activity and exercise should be regarded as important elements in both primary and secondary prevention of cardiovascular disease. There was a consistent association between about 150 minutes of moderate-to-vigorous physical activity each week and significant improvements in cardiometabolic and general health. At the same time, the results show that people who are physically inactive or those who have a chronic illness may gain benefits from making small increases in their level of activity and from reducing their time spent being sedentary, even if they are not able to reach the recommended levels of activity at first (Huang et al., 2025; Mu et al., 2021).

Due to findings in "Association between physical activity domains and cardiovascular diseases among US adults: evidence from NHANES 2007–2020", achieving the recommended minimum of 150 minutes of physical activity per week is associated with a lower risk of cardiovascular disease among U.S. adults. It is important to note that the more physically active a person becomes, especially if the level reaches 300 minutes or more each week, the greater the cardiovascular benefits, indicating a dose-response relationship between physical activity and the risk of cardiovascular disease. Both leisure-time physical activity (LTPA) and transportation-related physical activity (TPA) seem to contribute to cardiovascular health, while occupational physical activity (OPA) was not found to be significantly linked to CVD risk. These findings underline the need to take into account the setting in which physical activity takes place when assessing its health effects. In general, promoting regular physical activity, especially during leisure time and when

traveling, and urging people to go beyond the minimum recommended amounts could be an effective way of reducing their risk of cardiovascular disease (Huang et al., 2025).

The findings presented in the study “Exercise for Primary and Secondary Prevention of Cardiovascular Disease” show that regular physical activity is an important element in the prevention of cardiovascular disease. There is a lower risk of cardiovascular disease among people who meet the recommended amount of 150 minutes of moderate-to-vigorous physical activity each week, while those who do 300 minutes or more may obtain further benefits. Physical activity done during free time or while getting from place to place is linked to a lower risk of cardiovascular disease. In contrast, physical activity at work does not show a strong connection. This suggests that both how much and where people are active matter for heart health (Tucker et al., 2022).

Effects of Physical Activity on Glucose Metabolism

It has been suggested that physical activity could have positive effects on glucose metabolism through increased insulin sensitivity and by promoting glucose uptake that does not depend on insulin. When vigorous exercise is carried out, energy substances such as glucose, free fatty acids, and triglycerides are released into the blood due to activation of the sympathetic nervous system; these substrates are then taken up by skeletal muscles and used as a source of energy. Regular exercise causes an increase in the uptake and use of glucose and free fatty acids by muscle cells, mainly as a result of β -adrenergic signaling and AMP-activated protein kinase (Valenzuela et al., 2023).

Effects of Physical Activity on Lipid Metabolism

Dyslipidemia is a major risk factor for cardiovascular disease. In 2024, a systematic review and meta-analysis was carried out to look at the impact of physical exercise on blood lipid levels. The results indicated that exercise has beneficial effects on the levels of HDL, LDL, VLDL, and triglycerides. For every extra aerobic exercise session, there was a lowering of triglyceride levels by 7.68 mg/dL, and for each additional day of training, there was a decrease of 0.5 mg/dL. Moreover, longer exercise sessions also seemed to have a positive effect on HDL levels, since each extra minute of exercise was linked to an increase of 2.11 mg/dL.

The study looked at interventions involving resistance exercise, aerobic exercise, and a combination of both. The largest decrease in triglyceride levels was seen with combined training; this could be due to the various benefits offered by aerobic and resistance exercise. Aerobic exercise leads to a higher energy expenditure during the sessions, whereas resistance exercise is more effective at increasing muscle mass, which might in turn lead to a higher basal metabolic rate. The results also indicate that carrying out more than three exercise sessions each week for over 12 weeks might be especially effective in lowering triglyceride levels. A reduction in LDL levels was found with both aerobic and combined training, but not with resistance training (Smart et al., 2025).

Effects of Physical Activity on Blood Pressure

Physical activity can lower blood pressure in several ways. One of them is reduced activity of the sympathetic nervous system. This can lead to lower noradrenaline release and less constriction of blood vessels. As a result, the arteries become wider and peripheral vascular resistance decreases. Exercise may also reduce the effect of endothelin-1, which causes blood vessels to constrict.

There is also a mechanism involving nitric oxide (NO). Physical activity can increase the availability of NO, which in turn helps to relax the smooth muscle in the blood vessels and causes them to dilate. Moreover, regular exercise may enhance the blood vessels' response to acetylcholine and assist in vasodilation.

Physical activity can likewise lead to a modification of the structure of the blood vessel system, with existing blood vessels becoming wider and new ones developing by way of the growth of new blood vessels. Such changes can enhance blood flow and decrease resistance in the vessels. Moreover, exercise may reduce the size of the left side of the heart, in particular in individuals who have high blood pressure (Islam et al., 2023).

A meta-analysis from 2023 showed that physical activity can reduce resting systolic and diastolic blood pressure. Beneficial effects were found for aerobic exercise, dynamic resistance training, combined training, high-intensity interval training, and isometric exercise. The greatest reduction in blood pressure was observed with isometric exercise. These findings suggest that physical activity may be an important part of blood pressure control. Blood pressure above the optimal level is associated with a higher risk of cardiovascular disease. Therefore, lowering blood pressure through regular physical activity may be important in both the prevention and treatment of cardiovascular disease (Edwards et al., 2023).

Isometric resistance training may also be useful in blood pressure control, particularly in individuals with hypertension. A systematic review and meta-analysis including 12 studies and 415 participants with hypertension found that isometric resistance training significantly reduced office systolic blood pressure by 7.47 mmHg and diastolic blood pressure by 3.17 mmHg. Mean arterial pressure was lowered by 7.19 mmHg as well, with significant decreases in both systolic and diastolic blood pressure during the nighttime; however, no significant changes were detected in the mean 24-hour or daytime ambulatory blood pressure. Isometric resistance training may be a useful non-drug option to help control blood pressure in people with hypertension (Baffour-Awuah et al., 2023).

Effects of Physical Activity on Cardiovascular System

Aerobic physical activity can improve endothelial function and thus help in preventing arterial stiffness. It may also have a beneficial effect on the development of atherosclerotic plaques by reducing oxidative stress and the inflammatory markers that are involved in atherosclerosis. Moreover, regular physical activity may reduce blood coagulation and, as a result, lower the risk of thrombotic complications (Kazemi et al., 2024).

Effects of Physical Activity on the Structure of the Heart

The major changes that occur during long-term exercise take place in the heart. Physiological cardiac remodeling, commonly referred to as the “athlete’s heart,” is an adaptation to the increased demand of the body for oxygenated blood. Exercise can be divided into three types: endurance, strength, and combined exercise. The heart can change in different ways depending on the type of exercise. For example, endurance activities like running or swimming make the body need more oxygen-rich blood. This causes more blood to return to the heart, which fills the left ventricle more and stretches its walls. As a result, the heart pumps out more blood with each beat. The heart therefore undergoes eccentric remodeling, characterized primarily by an increase in the size of the ventricular cavity. During strength training, for example, weightlifting, the mechanism responsible for cardiac remodeling is different. During this type of exercise, blood pressure increases, resulting in greater pressure overload that the heart has to overcome. This mainly causes the cardiac muscle to thicken, especially the walls of the ventricles, thus producing concentric cardiac remodeling. When combined exercise is carried out, for example, cycling or rowing, both a pressure overload and a volume overload can take place, causing features of both eccentric and concentric remodeling.

The physiological remodeling of the athlete's heart is unlike that of pathological cardiac hypertrophy; during physiological adaptation the heart's structure and function remain normal or may, in fact, improve. On the other hand, pathological hypertrophy can impair heart function and increase the risk of cardiovascular problems (Štursová et al., 2023). The main effects of physical activity on cardiovascular health discussed in this review are summarized in Table 1.

Table 1. Summary of the main effects of physical activity on cardiovascular health

Area	Main effects of physical activity	Potential cardiovascular relevance
Physical activity and sedentary behavior	Increased daily physical activity and reduced sedentary time are associated with a more favorable cardiovascular risk profile	Lower cardiovascular risk and improved cardiometabolic health
Glucose metabolism	Increased glucose uptake and utilization by skeletal muscles	Improved glucose regulation and metabolic health
Lipid metabolism	Favorable changes in triglycerides, HDL and LDL levels	Improved lipid profile and reduced cardiovascular risk
Blood pressure	Reduced sympathetic activity, improved vasodilation and decreased peripheral vascular resistance	Reduction in systolic and diastolic blood pressure
Vascular function	Improved endothelial function and nitric oxide availability; reduced oxidative stress and inflammation	Improved vascular function and potential protection against atherosclerosis
Coagulation	Physical activity may reduce blood coagulation	Potential reduction in the risk of thrombotic complications

Cardiac structure	Physiological cardiac remodeling in response to long-term exercise	Adaptation of the heart to increased cardiovascular demands
Overall cardiovascular health	Improvement in multiple modifiable cardiovascular risk factors	Important role in primary and secondary prevention of CVD

4. CONCLUSION

Physical activity is a major factor that can be modified in order to promote cardiovascular health and plays a significant role in the prevention of cardiovascular disease. People who engage in higher amounts of regular physical activity are consistently found to have a more favorable cardiovascular risk profile, with this including better cardiorespiratory fitness, more effective regulation of blood pressure, improved metabolic health, and a more desirable body composition. On the other hand, physical inactivity and prolonged periods of a sedentary lifestyle are linked to a greater risk of cardiovascular illness and death. Even though there are well-known advantages to physical activity, a lack of physical activity is still very common and thus constitutes a significant and possibly alterable public health problem. These results highlight the importance of including the assessment and promotion of physical activity as part of regular cardiovascular risk management and preventive care. Interventions must be tailored to take into account age, existing fitness level, any comorbid conditions, and cardiovascular risk, with a focus on securing sustainable increases in daily physical activity and decreasing time spent being sedentary.

Healthcare professionals and public health systems have an important role to play in encouraging patients to adhere to the recommended levels of physical activity through education, behavioral interventions, and the implementation of supportive environmental measures. Combining individual interventions with population-level measures may help to improve long-term adherence and cardiovascular health. In summary, it should be regarded as an essential part of current cardiovascular prevention programs to increase habitual physical activity, as this has the potential to lower cardiovascular risk and lead to better long-term clinical results.

Acknowledgments

The authors want to thank all researchers whose published work provided the foundation for this review.

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Informed consent

Not applicable.

Ethical approval

Not applicable. This article does not contain any studies with human participants or animals performed by any of the authors.

Funding

This research did not receive any external funding like specific grant from funding agencies in the public, commercial, or nonprofit sectors.

Conflict of interest

The authors declare that they have no conflicts of interest, competing financial interest or personal relationship that could have influenced the work reported in this paper.

Data and materials availability

All data associated with this study will be available based on the reasonable request to the corresponding author.

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