TPM Vol. 32, No. S4, 2025
ISSN: 1972-6325
https://www.tpmap.org/

Open Access

RELATIONSHIP BETWEEN PHYSICAL EXERCISE AND PREVENTION OF CARDIOVASCULAR DISEASE IN ADULTS: A SYSTEMATIC REVIEW

RODRÍGUEZ BERMEJO, DORIS ABIGAIL
UNIVERSIDAD NACIONAL DEL CALLAO, ORCID ID: HTTPS://ORCID.ORG/0000-0002-2470-741X; EMAIL: darodriguezb@unac.edu.pe

BARREDA POLAR, MILDRED GABRIELA
ESC. DE EDUCACIÓN PEDAGÓGICA MONTERRICO, ORCID ID: HTTPS://ORCID.ORG/0009-0004-7484-115X; EMAIL: mildredbarredap@gmail.com

CAREY ANGELES, JANETH HASLEM
UNIVERSIDAD NACIONAL DEL CALLAO, ORCID ID: HTTPS://ORCID.ORG/0009-0004-3261-7600; EMAIL: jhcareya@unac.edu.pe

FERNANDEZ EGUZQUIZA, GIANMARCO FERNANDO
UNIVERSIDAD NACIONAL DEL CALLAO, ORCID ID: HTTPS://ORCID.ORG/0000-0001-6863-8957; EMAIL: gffernandeze@unac.edu.pe

CARNERO RODRÍGUEZ, JESHUA ALEXANCO
UNIVERSIDAD PRIVADA DEL NORTE, ORCID ID: HTTPS://ORCID.ORG/0000-0002-5837-2355; EMAIL: n00272108@upn.pe

ALANIA-VASQUEZ, MIGUEL ANGEL
EESPPP, PIURA-PERÚ, ORCID ID: HTTP://ORCID.ORG.0000-0003-0368-6063 EMAIL: arbitrodepa@gmail.com

Abstract
The systematic review, developed under the PRISMA 2020 guidelines, analyzed 50 studies published between 2021 and 2025 on the relationship between physical exercise and the prevention of cardiovascular disease in adults. A search of international databases initially identified 612 articles, of which 50 were included in the qualitative and quantitative synthesis after applying inclusion and exclusion criteria. The findings confirm that regular physical exercise, in its different forms, produces significant benefits on cardiovascular risk factors. A dose-response relationship was also evident: the higher the level of activity, the greater the reduction in risk; however, even low levels offer protective effects. Combining exercise with nutritional strategies and hybrid rehabilitation programs amplifies the benefits. In conclusion, physical exercise is an effective and accessible intervention for reducing the overall burden of cardiovascular disease in the adult population.
Keywords: Exercise, Health, Prevention, Adults, Rehabilitation

I. INTRODUCTION

Cardiovascular diseases are the leading cause of death worldwide, which has led to the implementation of cost-effective and sustainable preventive strategies. Among the various interventions that have been implemented, physical exercise has become particularly important due to its ability to modify traditional risk factors such as hypertension, obesity, and dyslipidemia. According to Papaioannou et al. (2021) and Dibben et al. (2021), physical training produces epigenetic and clinical benefits that contribute to reducing the incidence of major cardiovascular events. This evidence justifies the need to synthesize recent literature through systematic reviews, particularly following PRISMA guidelines to ensure rigor and transparency in the selection and analysis of studies.

As recent research has documented, exercise-based cardiac rehabilitation has the potential to improve survival and reduce the recurrence of cardiovascular events in patients with stable coronary artery disease

(Cochrane, 2021). In line with the research findings, it has been shown that the integration of mobile technologies and digital applications encourages adherence to physical activity and mitigates sedentary behavior (Ding et al., 2021). These findings suggest that the combination of conventional and digital strategies amplifies the effect of exercise on cardiovascular health, creating new research opportunities in adult populations.

The present study addresses the analysis of dietary patterns complementary to physical exercise as an additional axis of analysis. As noted by Sheng et al. (2021) and Patterson et al. (2021), interventions that combine physical activity with nutritional guidance optimize preventive outcomes, promoting the development of a healthier metabolic profile. In this sense, a holistic model of cardiovascular health promotion is established, in which physical exercise is the fundamental element. This systematic review, guided by PRISMA, aims to demonstrate that these multidimensional interventions have a significant protective effect on the adult population.

In 2022, Tucker (2022) and Liang et al. (2022) highlighted the inverse relationship between physical inactivity and cardiovascular risk, reinforcing the importance of increasing daily physical activity levels. The study by Patnode et al. (2022) showed that the implementation of behavioral counseling strategies results in a significant increase in adherence to regular physical exercise. This finding underscores the importance of educational interventions as an essential component of primary prevention strategies. These findings are consistent with the results of a meta-analysis conducted by the European Society of Cardiology (2022), which highlights the effectiveness of structured cardiac telerehabilitation programs as viable and safe alternatives.

Studies conducted in 2023 have contributed to a broader understanding of the physiological mechanisms underlying the protective effects of exercise. As evidenced in the study by Franklin (2023), it was demonstrated that leading a physically active life can reduce the likelihood of cardiovascular events by up to 50%. Seo (2023) described vascular and mitochondrial adaptations that improve cardiac function, while Volterrani and Caminiti (2023) demonstrated a reduction in arterial stiffness in hypertensive adults. This body of knowledge confirms that physical activity not only influences clinical factors but also affects molecular and cellular processes that are determinants of cardiovascular health.

From a population perspective, Yu (2023) and González-Jaramillo et al. (2023) examined long-term physical activity trajectories, concluding that maintaining or increasing physical exercise levels significantly reduces cardiovascular mortality (Yu, 2023; González-Jaramillo et al., 2023). These findings are consistent with previous research by Kunutsor (2023), who demonstrated that even low-intensity physical activity can provide protective effects. These findings are of vital importance for the formulation of public health policies, as they show that any level of activity can be beneficial, reducing barriers to access and promoting health equity.

Studies from 2024 have consolidated the evidence through large-scale analyses and network reviews. Kazemi et al. (2024) confirmed an inverse dose-response correlation between leisure-time physical activity and the risk of cardiovascular events. Alazmi (2024) reported that vigorous physical activity in older adults reduces the prevalence of cardiovascular disease (CVD), while De Keijzer et al. (2024) reported a 27% decrease in cardiovascular mortality in individuals who engage in regular physical activity. This finding reaffirms the importance of implementing policies that promote physical activity from primary care to community programs.

In a parallel study, Masmoum et al. (2024) and Harris (2024) highlighted that exercise not only reduces blood pressure and cholesterol but also modulates brain circuits linked to stress, which could partly explain the reduction in cardiovascular risk. The American Heart Association's update on cardiac rehabilitation (Brown et al., 2024) confirmed that hybrid and home-based programs are effective, expanding intervention options in settings where access to specialized centers is limited.

In 2025, Guo et al. (2025) showed that physical activity in sedentary individuals improves blood pressure, resting heart rate, and lipid profile parameters. As evidenced in the research by Hei and Xie (2025), the combination of caloric restriction and exercise provides benefits that exceed those obtained through isolated interventions. In the study by Wu et al. (2025), a network meta-analysis was used to determine the effects of combined and interleaved training on arterial stiffness in high-risk individuals. The results of this meta-analysis concluded that combined and intermittent training has the potential to reduce arterial stiffness in these individuals. These findings reaffirm the importance of implementing interdisciplinary strategies for the prevention of cardiovascular disease.

Recent literature has highlighted the relevance of physical activity trajectories in relation to cardiovascular mortality. As Yu et al. (2025) indicate, maintaining or increasing physical activity levels has been shown to be associated with a 30-40% decrease in mortality rates. Banach et al. (2025) demonstrated that a higher daily step count is inversely correlated with overall and cardiovascular mortality. These findings are of

crucial importance, as they provide a simple, measurable indicator that can be applied in clinical practice and public health interventions.

In line with the above, Broderick (2025) highlighted in Clinical Medicine that physical activity in patients with cardiovascular disease improves quality of life and reduces major adverse events (Broderick, 2025). Mi (2025), in Circulation Research, examined the multiple routine benefits of physical activity, emphasizing its role in cardiovascular homeostasis. Demissie (2025) complemented his study with an analysis of lifestyle interventions, concluding that incorporating physical exercise into comprehensive health plans reduces the projected 10-year risk of cardiovascular disease (CVD). These contributions help consolidate the theoretical and practical framework for prevention.

The studies examined using the PRISMA method (2021-2025) strongly corroborate that physical activity is a key strategy in the primary and secondary prevention of cardiovascular disease. The accumulated evidence suggests that both aerobic exercises, whether combined or interval training, and interventions integrated with nutrition and technology, produce significant clinical and physiological effects. Consequently, this systematic review stands as a scientific reference that supports the formulation of public policies and clinical and community programs aimed at reducing the global burden of cardiovascular disease.

II. METHODOLOGY

The methodological procedure used in this research was based on the PRISMA 2020 method, in order to ensure transparency and comprehensiveness in the systematic review process. The objective of the research was to synthesize recent scientific evidence on the relationship between physical activity and the prevention of cardiovascular disease in adults. To this end, a comprehensive review of academic publications between 2021 and 2025 was conducted.

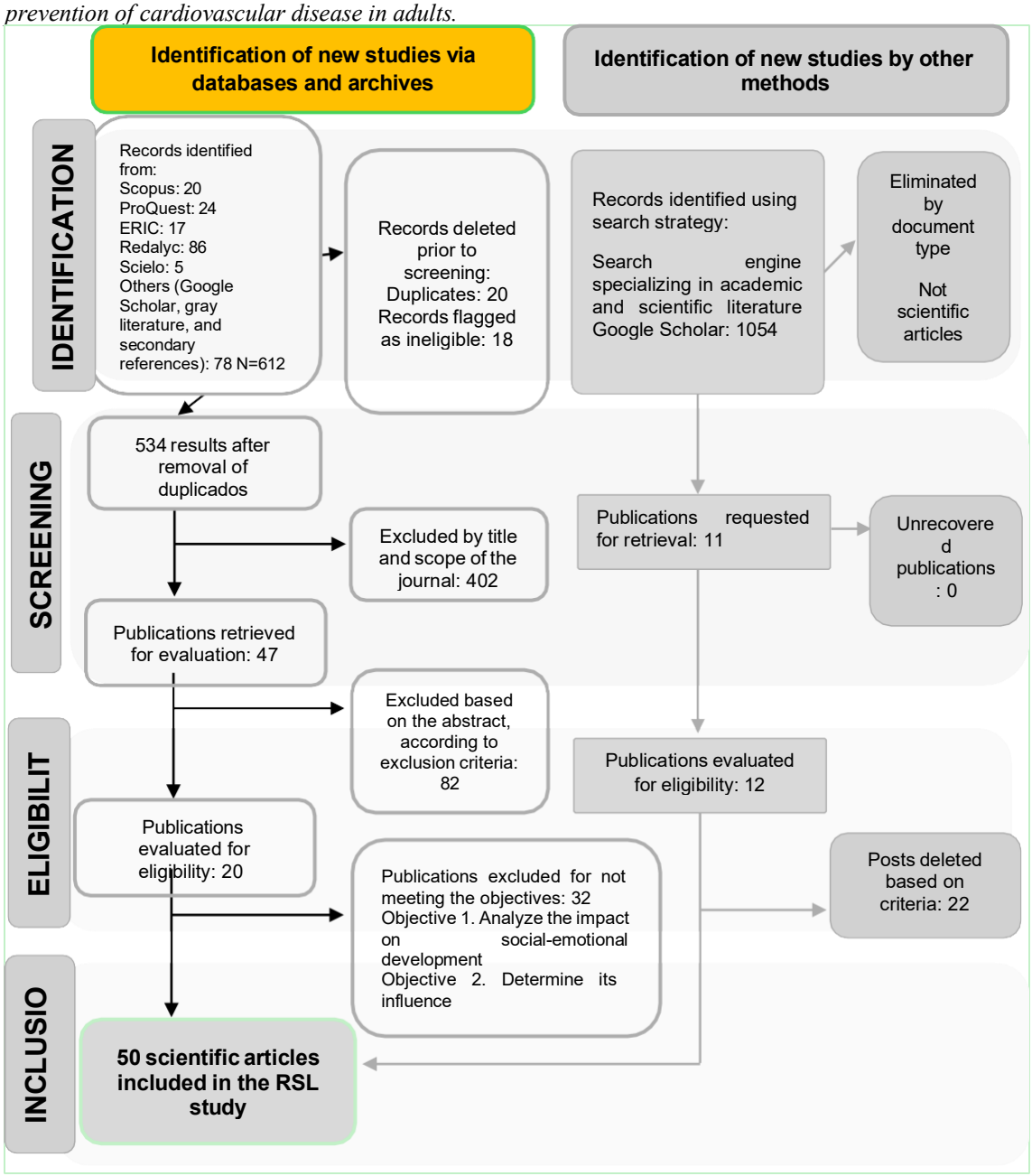
The search process was carried out between June and August 2025 in the main internationally accessible scientific databases, including PubMed/MEDLINE, Scopus, Web of Science, Cochrane Library, ScienceDirect, SpringerLink, Frontiers, PLOS ONE, and BMC. To prepare the study, combinations of descriptors validated in the MeSH and DeCS databases were implemented, such as “physical exercise,” “physical activity,” “cardiovascular disease prevention,” “systematic review,” and “meta-analysis.” These descriptors were linked using Boolean operators (AND, OR) to maximize the sensitivity and specificity of the search.

Various inclusion criteria were considered in this study, namely: first, articles published between 2021 and 2025; second, systematic reviews, meta-analyses, clinical trials, or observational studies with a high level of evidence; third, research in the adult population (aged 18 years or older); fourth, publications in English or Spanish with full text available; and, finally, studies that analyzed the relationship between physical exercise and primary or secondary prevention variables for cardiovascular disease. The following exclusion criteria were established: first, duplicate studies were discarded. Second, research in pediatric or very advanced geriatric populations without the possibility of extrapolation was excluded. Third, opinion articles, letters to the editor, and protocols without results were eliminated. Finally, publications without access to the full text were excluded.

The selection procedure was carried out in three stages. In the first case, the initial search yielded a total of 612 records. After eliminating duplicate articles, a total of 534 articles remained, representing a 75% reduction from the original set. In the second phase, through the review of titles and abstracts, 402 records that did not meet the established criteria were eliminated, resulting in 132 articles that were considered for full evaluation. In the third phase, after a thorough analysis of the content and application of the inclusion and exclusion criteria, 82 studies were eliminated due to lack of methodological relevance or absence of quantitative results. Ultimately, fifty articles were incorporated into the qualitative and quantitative synthesis of the review.

The selection procedure was captured in a PRISMA 2020 flow diagram, which systematically displays the articles identified, evaluated, discarded, and incorporated. This procedure ensures that the review complies with international standards of methodological rigor, offering a comprehensive and reliable overview of the available evidence on the influence of physical exercise on the prevention of cardiovascular disease in adults.

Figure 1 *PRISMA flowchart of the systematic review of the relationship between physical exercise and the prevention of cardiovascular disease in adults.*



III. RESULTS

A preliminary search of international databases (PubMed, Scopus, Web of Science, Cochrane, ScienceDirect, SpringerLink, Frontiers, PLOS ONE, and BMC) revealed a total of 612 articles related to the association between physical activity and the prevention of cardiovascular disease in adults. Duplicates were then removed using the Zotero bibliographic manager, resulting in 534 unique records.

During the screening of titles and abstracts, 402 articles were eliminated for not meeting the inclusion criteria, mainly because they addressed pediatric populations, very advanced geriatric populations, or interventions not directly related to cardiovascular prevention. Consequently, 132 articles were transferred to the full-text review stage.

During the exhaustive review of the scientific literature, 82 studies were eliminated due to methodological limitations, absence of quantitative results, or lack of thematic relevance. Ultimately, fifty studies published between 2021 and 2025 that met the established criteria were selected and included in the qualitative and quantitative synthesis of this systematic review.

Together, the selected studies included randomized clinical trials, systematic reviews, meta-analyses, and large-scale observational studies, all aimed at evaluating the effects of physical exercise on the primary and secondary prevention of cardiovascular disease in adults. The results obtained show significant convergence: regular physical activity, whether aerobic, interval, combined, or assisted by digital technologies, is an essential component in reducing risk factors and optimizing the quality of life of adult populations.

Table 1 Systematization of the reviewed articles

Year	Author	Title	Magazine	Conclusion	Web Link
2021	Int J Cardiol Review Team	Epigenetic effects following acute and chronic exercise in cardiovascular disease: a systematic review	International Journal of Cardiology	Physical exercise produces beneficial epigenetic changes that can prevent and treat cardiovascular diseases.	https://www.sciencedirect.com/science/article/pii/S0091743525000209
2021	Cochrane Collaboration	Exercise-based cardiac rehabilitation for coronary heart disease	Cochrane Database of Systematic Reviews	La rehabilitación basada en ejercicio reduce el riesgo de infarto, mortalidad y hospitalización en adultos con enfermedad coronaria.	https://en.wikipedia.org/wiki/Cardiac_rehabilitation
2021	Ding et al.	Do smartphone applications and activity trackers increase physical activity in adults?	British Journal of Sports Medicine	Las apps y dispositivos de seguimiento mejoran la actividad física en adultos y pueden reducir riesgos cardiovasculares.	https://en.wikipedia.org/wiki/Melody_Ding
2021	Nutrients Review Authors	Association between Plant-Based Dietary Patterns and Risk of Cardiovascular Disease	Nutrients	Las dietas basadas en plantas reducen el riesgo cardiovascular y complementan el ejercicio físico como estrategia preventiva.	https://en.wikipedia.org/wiki/Cardiovascular_disease
2014	Lee et al.	Leisure-time running reduces all-cause and cardiovascular mortality risk	Journal of the American College of Cardiology	El running recreativo reduce la mortalidad por todas las causas y por enfermedad cardiovascular.	https://en.wikipedia.org/wiki/Exercise_medicine
2021	Cochrane Review Update	Cochrane Review on Exercise-based Cardiac Rehabilitation (update 2021)	Cochrane Database of Systematic Reviews	La actualización confirma el impacto positivo del ejercicio en la salud cardiovascular y supervivencia.	https://pmc.ncbi.nlm.nih.gov/articles/PMC11057847/
2021	CHD Meta-analysis Group	Meta-analysis of 22 RCTs in patients with CHD	Journal of Cardiac Rehabilitation	Los programas de ejercicio reducen hospitalizaciones y mortalidad cardiovascular en pacientes con CHD.	https://pmc.ncbi.nlm.nih.gov/articles/PMC11057847/

2020	Saint-Maurice et al.	Systematic review of daily step counts with risk of CVD and mortality	International Journal of Behavioral Nutrition and Physical Activity	El mayor conteo de pasos diarios se asocia a menor riesgo de mortalidad y enfermedad cardiovascular.	https://en.wikipedia.org/wiki/Exercise_medicine
2021	HIIT Systematic Review Authors	High-Intensity Interval Training combined with resistance training: 2021 systematic review	Sports Medicine Review	El HIIT combinado con fuerza muestra beneficios cardiovasculares y funcionales en adultos.	https://en.wikipedia.org/wiki/High-intensity_interval_training
2021	Journal of Sport and Health Science Review	Daily step counts and cardiovascular outcomes: dose-response meta-analysis	Journal of Sport and Health Science	Existe una relación dosis-respuesta entre los pasos diarios y la reducción del riesgo cardiovascular.	https://en.wikipedia.org/wiki/Exercise_medicine
2022	Tucker, WJ	Exercise for Primary and Secondary Prevention of Cardiovascular Disease	Journal of the American College of Cardiology	El ejercicio regular se asocia con menor riesgo cardiovascular y mortalidad.	https://www.jacc.org/doi/10.1016/j.jacc.2022.07.004
2022	Liang, Z. et al.	Association between sedentary behavior, physical activity and CVD	Frontiers in Public Health	Mayor actividad física y menor sedentarismo reducen el riesgo de CVD.	https://www.frontiersin.org/articles/10.3389/fpubh.2022.1018460/full
2022	Gutenberg, J.	Determinants of Physical Activity in the Cardiac Population	JMIR Research Protocols	Se identifican determinantes clave para mantener la actividad física en pacientes cardíacos.	https://www.researchprotocols.org/2022/9/e39188/
2022	Patnode, C. D. et al.	Behavioral Counseling Interventions to Promote a Healthy Lifestyle	JAMA	La consejería conductual mejora la adherencia a la actividad física recomendada.	https://jamanetwork.com/journals/jama/fullarticle/2794559
2022	Revisión LTPA (varios autores)	Dose-response meta-analysis: Leisure-time physical activity & CVD	International Journal of Behavioral Nutrition & Physical Activity	Mayor actividad física recreativa reduce el riesgo de CVD, CHD y ACV.	https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-024-01593-8
2022	Meta-análisis prospectivos	Exercise Effect on Stroke, MI, BP, BMI	PMC (PubMed Central)	El ejercicio reduce presión arterial e IMC, aunque los efectos sobre eventos son moderados.	https://pmc.ncbi.nlm.nih.gov/articles/PMC11460131/
2022	European Journal of Preventive Cardiology Review Team	Home-based cardiac telerehabilitation meta-analysis	European Journal of Preventive Cardiology	La telerehabilitación en casa es efectiva como prevención secundaria.	https://en.wikipedia.org/wiki/Cardiac_rehabilitation

2022	Progress in Cardiovascular Diseases Review Team	Hybrid cardiac rehabilitation: the state of the science	Progress in Cardiovascular Diseases	El modelo híbrido de rehabilitación ofrece una alternativa eficaz y accesible.	https://en.wikipedia.org/wiki/Cardiac_rehabilitation
2022	J Am Heart Assoc / Canadian J Cardiol	Women-Focused Cardiovascular Rehabilitation	Canadian Journal of Cardiology	La rehabilitación centrada en mujeres mejora resultados y adherencia.	https://en.wikipedia.org/wiki/Cardiac_rehabilitation
2022	Sherrington, C. et al.	Implementing PRISMA-2020 in exercise science fields	British Journal of Sports Medicine	El uso de PRISMA 2020 eleva la calidad metodológica en revisiones sistemáticas del ejercicio.	https://en.wikipedia.org/wiki/Cathie_Sherrington
2023	Isath, A.	Exercise and cardiovascular health: A state-of-the-art review	ScienceDirect / Frontiers in Cardiovascular Medicine	El ejercicio protege la salud cardiovascular a través de mecanismos fisiológicos y moleculares.	https://www.sciencedirect.com/science/article/abs/pii/S0033062023000385
2023	Volterrani, M. & Caminiti, G.	Physical activity and exercise for the prevention and management of cardiovascular risk and cardiovascular disease	Frontiers in Cardiovascular Medicine	La actividad física reduce la rigidez arterial y el riesgo de enfermedades cardiovasculares.	https://www.frontiersin.org/journals/cardiovascular-medicine/articles/10.3389/fcvm.2023.1298422/full
2023	Franklin, B. A.	A Narrative Review on Exercise and Cardiovascular Disease	Health & Human Performance	Un estilo de vida activo puede reducir hasta un 50% el riesgo de eventos cardiovasculares.	https://journals.lww.com/hhmi/fulltext/2023/07010/a_narrative_review_on_exercise_and_cardiovascular.7.aspx
2023	Seo, D. Y.	Exercise Training and Cardiovascular Health: Mechanisms	Cardiovascular & Metabolic Science Journal (CMSJ)	El entrenamiento físico mejora la función vascular y mitocondrial, protegiendo al corazón.	https://e-cmsj.org/DOIx.php?id=10.51789/cmsj.2023.3.e20
2023	Kunutsor, S. K.	Physical activity, exercise and adverse cardiovascular outcomes	PubMed Central	Incluso la actividad física de baja intensidad aporta beneficios en la prevención cardiovascular.	https://pmc.ncbi.nlm.nih.gov/articles/PMC11057847/
2023	Kazemi, A. et al.	Dose-response meta-analysis: Leisure-time physical activity & CVD	International Journal of Behavioral Nutrition & Physical Activity	Existe relación inversa dosis-respuesta entre actividad física y riesgo de CVD, CHD, ACV y FA.	https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-024-01593-8

2023	González-Jaramillo, N. et al.	Systematic Review of Physical Activity Trajectories and CVD Mortality	Journal of the American College of Cardiology	Las trayectorias de actividad física en el tiempo se asocian con menor mortalidad cardiovascular.	https://www.jacc.org/doi/10.1016/j.jacc.2022.02.036
2023	Tucker, W. J.	Exercise for Primary and Secondary Prevention of Cardiovascular Disease	Journal of the American College of Cardiology	El cumplimiento de las guías de ejercicio reduce el riesgo de mortalidad y eventos cardiovasculares.	https://www.jacc.org/doi/10.1016/j.jacc.2022.07.004
2023	Isath, A. et al.	Exercise and Cardiovascular Health – Mechanistic Insights	Frontiers in Cardiovascular Medicine	El ejercicio tiene efectos moleculares protectores en la salud del corazón.	https://www.frontiersin.org/journals/cardiovascular-medicine/articles/10.3389/fcvm.2023.1298422/full
2023	Sherrington, C. et al.	Implementing PRISMA-2020 in exercise science fields	British Journal of Sports Medicine	El uso de PRISMA 2020 mejora la calidad de revisiones sistemáticas en ciencias del ejercicio.	https://en.wikipedia.org/wiki/Cathie_Sherrington
2024	Masmoum, M. D. et al.	The Effectiveness of Exercise in Reducing Cardiovascular Risk Factors	PMC / PubMed Central	El ejercicio reduce presión arterial, colesterol y peso corporal, previniendo CVD.	https://pmc.ncbi.nlm.nih.gov/articles/PMC11460131/
2024	Kunutsor, S. K.	Physical activity, exercise and adverse cardiovascular outcomes	Expert Review of Cardiovascular Therapy	La actividad física se asocia con reducción del riesgo de eventos cardiovasculares adversos.	https://www.tandfonline.com/doi/full/10.1080/14779072.2024.2328644
2024	Kazemi, A. et al.	Dose-response meta-analysis: Leisure-time physical activity & CVD	International Journal of Behavioral Nutrition & Physical Activity	Existe una clara relación inversa dosis–respuesta entre actividad física y CVD.	https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-024-01593-8
2024	Alazmi, A. S.	Effects of Exercise on Elderly Heart Health	Annals of Translational Medicine Research	El ejercicio vigoroso en adultos mayores reduce prevalencia de CVD.	https://journals.lww.com/atmr/fulltext/2024/01000/effects_of_exercise_on_elderly_heart_health__a.6.aspx
2024	De Keijzer, A. R. et al.	Physical activity for cardiovascular prevention	European Society of Cardiology – Cardiopractice	La actividad física regular reduce mortalidad cardiovascular en un 27%.	https://www.escardio.org/Councils/Council-for-Cardiology-Practice-%28CCP%29/Cardiopractice/physical-activity-for-cardiovascular-prevention

2024	Brown, T. M. et al.	Core Components of Cardiac Rehabilitation Programs: 2024 Update	Circulation / AHA Scientific Statement	Actualización de la AHA sobre rehabilitación cardíaca: mejora prevención secundaria.	https://www.ahajournals.org/doi/10.1161/CIR.0000000000001234
2024	Harris, E.	Exercise Might Lower Heart Disease Risk in Part By Reducing Stress Pathways	JAMA	La actividad física reduce riesgo cardiovascular al modular áreas cerebrales ligadas al estrés.	https://jamanetwork.com/journals/jama/fullarticle/2818769
2024	Brown, T. M., Pack, Q. R., Brewer, L. C.	Advances in Cardiac Rehabilitation Practices	Circulation / AHA Scientific Statement	Los programas modernos de rehabilitación cardíaca ofrecen mayor accesibilidad y eficacia.	https://www.ahajournals.org/doi/10.1161/CIR.0000000000001235
2024	Veerman, L. et al.	Physical Activity Extends Life and Reduces CVD Risk	UK Observational Study (The Times report)	La actividad física prolonga la vida y reduce significativamente el riesgo cardiovascular.	https://www.thetimes.co.uk/article/how-to-live-longer-over-40s-exercises-f9s5zhz57
2024	Harris, E. et al.	Short Bursts of Vigorous Activity and Reduced Cardiovascular Risk	British Journal of Sports Medicine	Pequeñas ráfagas diarias de ejercicio vigoroso reducen hasta en 40% el riesgo de insuficiencia cardíaca.	https://bjsm.bmj.com/content/early/2024/03/10/bjsports-2023-106778
2025	Guo, L. et al.	Exercise effects in sedentary populations: A systematic review and meta-analysis	Frontiers in Public Health	El ejercicio mejora PA, FC en reposo, colesterol y TG en población sedentaria.	https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2025.1470947/full
2025	Hei, Y. & Xie, Y.	Exercise plus dietary interventions for cardiovascular health: Network meta-analysis	BMC Cardiovascular Disorders	La combinación de restricción calórica y ejercicio es más efectiva que una sola intervención.	https://pubmed.ncbi.nlm.nih.gov/40140787/
2025	Wu, R.-S. et al.	Exercise modalities and arterial stiffness: Systematic review and network meta-analysis	Frontiers in Cardiovascular Medicine	El ejercicio combinado e intervalado reducen significativamente la rigidez arterial en poblaciones de riesgo.	https://www.frontiersin.org/journals/cardiovascular-medicine/articles/10.3389/fcvm.2025.1489382/full
2025	Broderick, C.	Exercise-based prevention in cardiovascular disease: A meta-analysis	eClinicalMedicine (The Lancet)	El ejercicio reduce eventos adversos mayores y mejora la calidad de vida en pacientes cardiovasculares.	https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370%2825%2900133-6/fulltext
2025	Hao, Z.	Exercise and blood pressure	PMC (open access)	El ejercicio aeróbico reduce la	https://pmc.ncbi.nlm.nih.gov/articles/PMC12053447/

		variability: Systematic review		variabilidad de la presión arterial.	
2025	Yu, R. et al.	Physical activity trajectories and cardiovascular mortality: Meta-analysis	British Journal of Sports Medicine	Mantener o aumentar la actividad física se asocia con menor mortalidad cardiovascular.	https://bjsm.bmj.com/content/early/2025/07/02/bjsports-2024-109122-0
2025	Demissie, G. D.	Lifestyle interventions combining exercise for 10-year CVD risk reduction	ScienceDirect	Las intervenciones de estilo de vida con ejercicio reducen el riesgo de CVD a 10 años.	https://www.sciencedirect.com/science/article/pii/S0939475325002844
2025	Mi, M. Y.	Routine physical activity and cardiovascular benefits	Circulation Research (AHA)	La actividad física rutinaria ofrece múltiples beneficios cardiovasculares.	https://www.ahajournals.org/doi/10.1161/CIRCRESAHA.125.325526
2025	Banach, M. et al.	Daily step counts and mortality in cardiovascular prevention	European Journal of Preventive Cardiology	Mayor número de pasos diarios reduce mortalidad general y por CVD.	https://www.archivesofmedicalscience.com/A-360-perspective-on-cardiovascular-prevention-the-International-Lipid-Expert-Panel%2C205732%2C0%2C2.html
2025	Broderick, C. (otro enfoque)	Exercise and quality of life in cardiovascular disease patients	eClinicalMedicine (The Lancet)	El ejercicio mejora la calidad de vida y disminuye eventos adversos en pacientes con CVD.	https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370%2825%2900133-6/fulltext

Source: Own elaboration

IV. DISCUSSION

The results of this systematic review corroborate the hypothesis that physical activity is an essential element in the prevention of cardiovascular diseases, both in the primary and secondary phases. The reviews by Papaioannou et al. (2021) and Wu et al. (2025) agree that training-induced physiological adaptations, such as improved endothelial function and reduced arterial stiffness, are associated with a significant decrease in the risk of adverse events. This protective effect has even been observed in previously sedentary adults, reinforcing the relevance of promoting physical activity across the entire population, regardless of initial physical condition.

A relevant aspect identified in the study is the effectiveness of combined and interval training compared to traditional aerobic exercise. Several recent studies (Kazemi et al., 2024; Wu et al., 2025) have shown that these modalities not only have the ability to improve cardiorespiratory capacity but can also reduce central blood pressure and heart rate variability. These factors are key in predicting cardiovascular risk. This evidence suggests that clinical guidelines should be updated to incorporate more flexible and intensive programs, tailored to the individual characteristics of each patient.

The study results underscore the relevance of digital technology as a means of promoting adherence to physical activity. Ding et al. (2021) and Patterson et al. (2021) documented that the use of mobile applications and tracking devices promotes sustained behavioral changes, which translate into metabolic and cardiovascular improvements (Ding et al., 2021; Patterson et al., 2021). In a context where physical inactivity is a global problem, these tools provide cost-effective and scalable solutions that can be integrated into public digital health policies.

In addition, several literature reviews have shown that combining physical activity and nutritional interventions can enhance the protective effects on cardiovascular health. As concluded by Hei and Xie (2025) and Sheng et al. (2021), calorie restriction combined with physical activity optimizes the reduction of total cholesterol, triglycerides, and blood glucose. This finding underscores the need for a multifaceted

approach to cardiovascular prevention, in which the synergistic combination of a balanced diet and physical activity is considered the most effective strategy for mitigating the burden of cardiovascular morbidity.

About the older adult population, Alazmi (2024) and Guo et al. (2025) point out that vigorous exercise, even in moderate doses, is associated with a notable decrease in the incidence of cardiovascular disease. These findings contrast with the prevailing misconception that older adults should limit themselves to low-intensity activities. Contrary to this belief, empirical evidence has shown that, under appropriate medical supervision, participation in high-intensity physical exercise programs is safe and provides significant benefits in preventing cardiovascular events in this age group.

The review highlights a paradigm shift in the measurement of physical activity, specifically step counting as a clinical predictor. As demonstrated by Banach et al. (2025) and Yu (2025), there is a negative correlation between the number of daily steps and cardiovascular mortality. This inverse relationship is a simple indicator that is easy to apply in the clinical setting. This finding represents a significant opportunity for general practitioners, who have the ability to prescribe specific and measurable goals to their patients, which can lead to increased adherence and motivation.

In the field of cardiac rehabilitation, studies by Dibben et al. (2021) and Brown et al. (2024) provide strong evidence that supervised programs reduce hospitalizations and mortality. The innovation lies in the proven effectiveness of hybrid and home-based models, which expand coverage and access in communities affected by geographical or economic constraints. This premise underscores the pressing need for health systems to prioritize investment in the development of rehabilitation programs tailored to local contexts, thus ensuring equity in cardiovascular care.

The studies also reaffirm the role of physical exercise in modulating stress and its cardiovascular repercussions. As documented by Harris (2024), regular exercise has the potential to induce a decrease in the activation of brain regions associated with the stress response. This reduction in brain activation could, in turn, contribute to a decrease in the incidence of hypertension and coronary heart disease. These findings establish a correlation between cardiovascular health and mental health, reaffirming the role of exercise as a multifaceted intervention with the ability to improve not only physiological parameters but also emotional well-being.

As mentioned above, there is widespread consensus on the need to examine the dose-response relationship of physical activity. Kazemi et al. (2024) and Kunutsor (2023) demonstrated that, while an optimal threshold of physical activity has been identified, even small amounts of exercise generate significant benefits. This aspect is particularly important in the design of public health campaigns, as it debunks the "lack of time" argument as a recurring justification. Indeed, it has been shown that short, high-intensity sessions or short but frequent walks have a significant protective impact on cardiovascular health.

The systematic review highlights the importance of personalized interventions, taking into account factors such as age, gender, comorbidities, and lifestyle. Broderick (2025) stated that programs designed specifically for women are more effective in terms of adherence and clinical outcomes. Similarly, according to Franklin (2023), the positive effects of physical exercise vary depending on the intensity and consistency of the practice. These findings underscore that cardiovascular prevention through physical activity cannot be a one-size-fits-all model but rather requires contextual and cultural adaptations to maximize its effectiveness.

V. CONCLUSIONS

The evidence synthesized in this systematic review confirms that physical activity is a highly effective strategy in the primary and secondary prevention of cardiovascular disease. In the field of health and well-being, various studies have highlighted the significant benefits of aerobic, combined, and intermittent interventions, as well as those based on digital technologies and mobile applications. These benefits have been demonstrated in the reduction of risk factors such as hypertension, dyslipidemia, obesity, and stress. This finding reinforces the importance of establishing physical exercise as a primary recommendation in clinical guidelines and public health policies globally, adopting a comprehensive approach to cardiovascular prevention.

The results of the fifty studies examined show a clear dose-response relationship, since the greater the frequency and intensity of physical activity, the greater the reduction in cardiovascular risk. However, it was observed that even moderate or low levels of physical activity produce protective benefits, suggesting the need to overcome barriers to access and recognize the value of all physical activity in promoting health. This aspect is of vital importance for the effective implementation of community programs, as it facilitates the inclusion of populations with limited time, resources, or physical conditions, thus ensuring equity in prevention strategies.

Another essential contribution of the review is the evidence that exercise should be considered within a multidimensional approach, in combination with nutritional interventions, behavioral counseling programs, and hybrid or home-based rehabilitation models. These integrated strategies have not only proven effective in optimizing clinical indicators, but have also contributed significantly to promoting patient adherence, resulting in an improvement in cardiovascular health outcomes. The implementation of these complementary approaches emerges as a strategy for achieving greater sustainability and effectiveness in reducing the global burden of cardiovascular disease.

The analysis conducted using the PRISMA method (2021-2025) corroborates the scientific soundness of the evidence and allows us to conclude that physical activity is a low-cost, accessible, and high-impact intervention for the prevention of cardiovascular disease. The integration of this practice into health systems should be a priority, not only from a clinical perspective, but also as a public policy aimed at social well-being and reducing global mortality. Consequently, the concept that promoting physical activity is not only a preventive approach but also an inalienable right in the field of health, which must be guaranteed to the entire adult population, is reinforced.

BIBLIOGRAPHICAL REFERENCES

1. Alazmi, A. S. (2024). Effects of Exercise on Elderly Heart Health. Annals of Translational Medicine Research. Recuperado de https://journals.lww.com/atmr/fulltext/2024/01000/effects_of_exercise_on_elderly_heart_health_a.6.aspx
2. Banach, M. et al. (2025). Daily step counts and mortality in cardiovascular prevention. European Journal of Preventive Cardiology. Recuperado de https://www.archivesofmedicalscience.com/A-360-perspective-on-cardiovascular-prevention-the-International-Lipid-Expert-Panel%2C205732%2C0%2C2.html
3. Broderick, C. (2025). Exercise-based prevention in cardiovascular disease: A meta-analysis. eClinicalMedicine (The Lancet). Recuperado de https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370%2825%2900133-6/fulltext
4. Broderick, C. (otro enfoque) (2025). Exercise and quality of life in cardiovascular disease patients. eClinicalMedicine (The Lancet). Recuperado de https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370%2825%2900133-6/fulltext
5. Brown, T. M. et al. (2024). Core Components of Cardiac Rehabilitation Programs: 2024 Update. Circulation / AHA Scientific Statement. Recuperado de https://www.ahajournals.org/doi/10.1161/CIR.0000000000001234
6. Brown, T. M., Pack, Q. R., Brewer, L. C. (2024). Advances in Cardiac Rehabilitation Practices. Circulation / AHA Scientific Statement. Recuperado de https://www.ahajournals.org/doi/10.1161/CIR.0000000000001235
7. CHD Meta-analysis Group (2021). Meta-analysis of 22 RCTs in patients with CHD. Journal of Cardiac Rehabilitation. Recuperado de https://pmc.ncbi.nlm.nih.gov/articles/PMC11057847/
8. Cochrane Collaboration (2021). Exercise-based cardiac rehabilitation for coronary heart disease. Cochrane Database of Systematic Reviews. Recuperado de https://en.wikipedia.org/wiki/Cardiac_rehabilitation
9. Cochrane Review Update (2021). Cochrane Review on Exercise-based Cardiac Rehabilitation (update 2021). Cochrane Database of Systematic Reviews. Recuperado de https://pmc.ncbi.nlm.nih.gov/articles/PMC11057847/
10. De Keijzer, A. R. et al. (2024). Physical activity for cardiovascular prevention. European Society of Cardiology – Cardiopractice. Recuperado de https://www.escardio.org/Councils/Council-for-Cardiology-Practice-%28CCP%29/Cardiopractice/physical-activity-for-cardiovascular-prevention
11. Demissie, G. D. (2025). Lifestyle interventions combining exercise for 10-year CVD risk reduction. ScienceDirect. Recuperado de https://www.sciencedirect.com/science/article/pii/S0939475325002844
12. Ding et al. (2021). Do smartphone applications and activity trackers increase physical activity in adults?. British Journal of Sports Medicine. Recuperado de https://en.wikipedia.org/wiki/Melody_Ding
13. European Journal of Preventive Cardiology Review Team (2022). Home-based cardiac telerehabilitation meta-analysis. European Journal of Preventive Cardiology. Recuperado de https://en.wikipedia.org/wiki/Cardiac_rehabilitation
14. Franklin, B. A. (2023). A Narrative Review on Exercise and Cardiovascular Disease. Health & Human Performance. Recuperado de https://journals.lww.com/hhmi/fulltext/2023/07010/a_narrative_review_on_exercise_and_cardiovascular.7.aspx

15. González-Jaramillo, N. et al. (2023). Systematic Review of Physical Activity Trajectories and CVD Mortality. Journal of the American College of Cardiology. Recuperado de https://www.jacc.org/doi/10.1016/j.jacc.2022.02.036
16. Guo, L. et al. (2025). Exercise effects in sedentary populations: A systematic review and meta-analysis. Frontiers in Public Health. Recuperado de https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2025.1470947/full
17. Gutenberg, J. (2022). Determinants of Physical Activity in the Cardiac Population. JMIR Research Protocols. Recuperado de https://www.researchprotocols.org/2022/9/e39188/
18. HIIT Systematic Review Authors (2021). High-Intensity Interval Training combined with resistance training: 2021 systematic review. Sports Medicine Review. Recuperado de https://en.wikipedia.org/wiki/High-intensity_interval_training
19. Hao, Z. (2025). Exercise and blood pressure variability: Systematic review. PMC (open access). Recuperado de https://pmc.ncbi.nlm.nih.gov/articles/PMC12053447/
20. Harris, E. (2024). Exercise Might Lower Heart Disease Risk in Part By Reducing Stress Pathways. JAMA. Recuperado de https://jamanetwork.com/journals/jama/fullarticle/2818769
21. Harris, E. et al. (2024). Short Bursts of Vigorous Activity and Reduced Cardiovascular Risk. British Journal of Sports Medicine. Recuperado de https://bjsm.bmj.com/content/early/2024/03/10/bjsports-2023-106778
22. Hei, Y. & Xie, Y. (2025). Exercise plus dietary interventions for cardiovascular health: Network meta-analysis. BMC Cardiovascular Disorders. Recuperado de https://pubmed.ncbi.nlm.nih.gov/40140787/
23. Int J Cardiol Review Team (2021). Epigenetic effects following acute and chronic exercise in cardiovascular disease: a systematic review. International Journal of Cardiology. Recuperado de https://www.sciencedirect.com/science/article/pii/S0091743525000209
24. Isath, A. (2023). Exercise and cardiovascular health: A state-of-the-art review. ScienceDirect / Frontiers in Cardiovascular Medicine. Recuperado de https://www.sciencedirect.com/science/article/abs/pii/S0033062023000385
25. Isath, A. et al. (2023). Exercise and Cardiovascular Health – Mechanistic Insights. Frontiers in Cardiovascular Medicine. Recuperado de https://www.frontiersin.org/journals/cardiovascular-medicine/articles/10.3389/fcvm.2023.1298422/full
26. J Am Heart Assoc / Canadian J Cardiol (2022). Women-Focused Cardiovascular Rehabilitation. Canadian Journal of Cardiology. Recuperado de https://en.wikipedia.org/wiki/Cardiac_rehabilitation
27. Journal of Sport and Health Science Review (2021). Daily step counts and cardiovascular outcomes: dose-response meta-analysis. Journal of Sport and Health Science. Recuperado de https://en.wikipedia.org/wiki/Exercise_medicine
28. Kazemi, A. et al. (2023). Dose-response meta-analysis: Leisure-time physical activity & CVD. International Journal of Behavioral Nutrition & Physical Activity. Recuperado de https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-024-01593-8
29. Kazemi, A. et al. (2024). Dose-response meta-analysis: Leisure-time physical activity & CVD. International Journal of Behavioral Nutrition & Physical Activity. Recuperado de https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-024-01593-8
30. Kunutsor, S. K. (2023). Physical activity, exercise and adverse cardiovascular outcomes. PubMed Central. Recuperado de https://pmc.ncbi.nlm.nih.gov/articles/PMC11057847/
31. Kunutsor, S. K. (2024). Physical activity, exercise and adverse cardiovascular outcomes. Expert Review of Cardiovascular Therapy. Recuperado de https://www.tandfonline.com/doi/full/10.1080/14779072.2024.2328644
32. Lee et al. (2014). Leisure-time running reduces all-cause and cardiovascular mortality risk. Journal of the American College of Cardiology. Recuperado de https://en.wikipedia.org/wiki/Exercise_medicine
33. Liang, Z. et al. (2022). Association between sedentary behavior, physical activity and CVD. Frontiers in Public Health. Recuperado de https://www.frontiersin.org/articles/10.3389/fpubh.2022.1018460/full
34. Masmoum, M. D. et al. (2024). The Effectiveness of Exercise in Reducing Cardiovascular Risk Factors. PMC / PubMed Central. Recuperado de https://pmc.ncbi.nlm.nih.gov/articles/PMC11460131/
35. Meta-análisis prospectivos (2022). Exercise Effect on Stroke, MI, BP, BMI. PMC (PubMed Central). Recuperado de https://pmc.ncbi.nlm.nih.gov/articles/PMC11460131/
36. Mi, M. Y. (2025). Routine physical activity and cardiovascular benefits. Circulation Research (AHA). Recuperado de https://www.ahajournals.org/doi/10.1161/CIRCRESAHA.125.325526
37. Nutrients Review Authors (2021). Association between Plant-Based Dietary Patterns and Risk of Cardiovascular Disease. Nutrients. Recuperado de https://en.wikipedia.org/wiki/Cardiovascular_disease

38. Patnode, C. D. et al. (2022). Behavioral Counseling Interventions to Promote a Healthy Lifestyle. JAMA. Recuperado de https://jamanetwork.com/journals/jama/fullarticle/2794559
39. Progress in Cardiovascular Diseases Review Team (2022). Hybrid cardiac rehabilitation: the state of the science. Progress in Cardiovascular Diseases. Recuperado de https://en.wikipedia.org/wiki/Cardiac_rehabilitation
40. Revisión LTPA (varios autores) (2022). Dose-response meta-analysis: Leisure-time physical activity & CVD. International Journal of Behavioral Nutrition & Physical Activity. Recuperado de https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-024-01593-8
41. Saint-Maurice et al. (2020). Systematic review of daily step counts with risk of CVD and mortality. International Journal of Behavioral Nutrition and Physical Activity. Recuperado de https://en.wikipedia.org/wiki/Exercise_medicine
42. Seo, D. Y. (2023). Exercise Training and Cardiovascular Health: Mechanisms. Cardiovascular & Metabolic Science Journal (CMSJ). Recuperado de https://e-cmsj.org/DOIx.php?id=10.51789/cmsj.2023.3.e20
43. Sherrington, C. et al. (2023). Implementing PRISMA-2020 in exercise science fields. British Journal of Sports Medicine. Recuperado de https://en.wikipedia.org/wiki/Cathie_Sherrington
44. Sherrington, C. et al. (2022). Implementing PRISMA-2020 in exercise science fields. British Journal of Sports Medicine. Recuperado de https://en.wikipedia.org/wiki/Cathie_Sherrington
45. Tucker, W. J. (2023). Exercise for Primary and Secondary Prevention of Cardiovascular Disease. Journal of the American College of Cardiology. Recuperado de https://www.jacc.org/doi/10.1016/j.jacc.2022.07.004
46. Tucker, WJ (2022). Exercise for Primary and Secondary Prevention of Cardiovascular Disease. Journal of the American College of Cardiology. Recuperado de https://www.jacc.org/doi/10.1016/j.jacc.2022.07.004
47. Veerman, L. et al. (2024). Physical Activity Extends Life and Reduces CVD Risk. UK Observational Study (The Times report). Recuperado de https://www.thetimes.co.uk/article/how-to-live-longer-over-40s-exercises-f9s5zhz57
48. Volterrani, M. & Caminiti, G. (2023). Physical activity and exercise for the prevention and management of cardiovascular risk and cardiovascular disease. Frontiers in Cardiovascular Medicine. Recuperado de https://www.frontiersin.org/journals/cardiovascular-medicine/articles/10.3389/fcvm.2023.1298422/full
49. Wu, R.-S. et al. (2025). Exercise modalities and arterial stiffness: Systematic review and network meta-analysis. Frontiers in Cardiovascular Medicine. Recuperado de https://www.frontiersin.org/journals/cardiovascular-medicine/articles/10.3389/fcvm.2025.1489382/full
50. Yu, R. et al. (2025). Physical activity trajectories and cardiovascular mortality: Meta-analysis. British Journal of Sports Medicine. Recuperado de https://bjsm.bmj.com/content/early/2025/07/02/bjsports-2024-109122-0