

## The Role of Exercise Therapy in Reducing the Risk of Cardiovascular Disease in an Elderly Population: A Prospective Cohort Study

### El papel de la terapia con ejercicios en la reducción del riesgo de enfermedad cardiovascular en una población de edad avanzada: un estudio de cohorte prospectivo

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**Abstract.** This study examined how exercise therapy reduces the risk of cardiovascular disease (CVD) in older adults, using a prospective cohort study methodology to evaluate the effects of exercise therapy on cardiovascular events. We carefully review relevant research publications and clinical studies, as well as partner with specialists on these topics. Several studies have examined how exercise therapy affects cardiovascular health in older adults. These studies have consistently shown that regular exercise lowers the risk of cardiovascular disease and improves outcomes in this population. A review of randomised controlled studies found that aerobic exercise regimens, resistance, and combinations increased cardiovascular risk factors. To assess long-term health changes and trends, we measured key cardiovascular parameters before and after the intervention using longitudinal data from subjects engaged in different types of physical activity. We selected the research subjects using strict inclusion and exclusion criteria to ensure the reliability of the data. These changes involve reduced circulatory tension, an improved lipid profile, and glucose digestion. A prospective cohort study showed a dose-response relationship between exercise and CVD risk reduction. Higher physical activity reduces cardiovascular incidence and mortality among the elderly. Exercise treatments improve the elderly's physical fitness and functional capacity, as well as cardiovascular risk factors. Physical fitness improves heart health and quality of life. Sports medicine has also demonstrated improvements in obesity, diabetes, and musculoskeletal disease among the elderly. This review of studies emphasises the role of exercise therapy in preventing and treating cardiovascular disease in the elderly. Regular exercise in this population is essential for heart health, functional independence, and well-being.

**Keywords:** sports therapy; cardiovascular diseases; prospective cohort studies; physical fitness; heart health.

**Resumen.** Este estudio examinó cómo la terapia de ejercicio reduce el riesgo de enfermedad cardiovascular (ECV) en adultos mayores, utilizando una metodología de estudio de cohorte prospectiva para evaluar los efectos de la terapia de ejercicio en los eventos cardiovasculares. Revisamos cuidadosamente las publicaciones de investigación y los estudios clínicos relevantes, y nos asociamos con especialistas en estos temas. Varios estudios han examinado cómo la terapia de ejercicio afecta la salud cardiovascular en adultos mayores. Estos estudios han demostrado consistentemente que el ejercicio regular reduce el riesgo de enfermedad cardiovascular y mejora los resultados en esta población. Una revisión de estudios controlados aleatorios encontró que los regímenes de ejercicio aeróbico, la resistencia y las combinaciones aumentaron los factores de riesgo cardiovascular. Para evaluar los cambios y tendencias de salud a largo plazo, medimos los parámetros cardiovasculares clave antes y después de la intervención utilizando datos longitudinales de sujetos que realizaban diferentes tipos de actividad física. La selección de los sujetos de investigación se utilizaron criterios estrictos de inclusión y exclusión para garantizar la fiabilidad de los datos. Estos cambios implican una reducción de la tensión circulatoria, un mejor perfil lipídico y la digestión de la glucosa. Un estudio de cohorte prospectivo mostró una relación dosis-respuesta entre el ejercicio y la reducción del riesgo de ECV. Una mayor actividad física reduce la incidencia cardiovascular y la mortalidad entre los ancianos. Los tratamientos con ejercicio mejoran la condición física y la capacidad funcional de las personas mayores, así como los factores de riesgo cardiovascular. La aptitud física mejora la salud del corazón y la calidad de vida. La medicina deportiva también ha demostrado mejoras en la obesidad, la diabetes y las enfermedades musculoesqueléticas entre los ancianos. Esta revisión de estudios enfatiza el papel de la terapia con ejercicios en la prevención y el tratamiento de la enfermedad cardiovascular en los ancianos. El ejercicio regular en esta población es esencial para la salud del corazón, la independencia funcional y el bienestar.

**Palabras clave:** terapia deportiva; enfermedades cardiovasculares; estudios de cohortes prospectivos; aptitud física; salud del corazón.

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## Introduction

Cardiovascular Sickness (CVD) incorporates a scope of issues influencing the heart and veins, including conditions like coronary corridor illness, cardiovascular breakdown, arrhythmias, and stroke (Malakar et al., 2019). As a significant global health concern, it ranks among the primary causes of morbidity and mortality, with an exceptionally high impact on the elderly population. Advancing age increases the vulnerability to CVD due to various factors (de Almeida et al., 2020). Age-related changes in blood vessels

result in reduced elasticity, making them more prone to damage and atherosclerosis (Castelli et al., 2023). The plaque accumulation in arteries further contributes to arterial stiffness and narrowing, leading to impaired blood flow and increased CVD risk.

Moreover, declining heart muscle efficiency and diminished cardiac reserve make the heart less resilient to stressors, potentially leading to heart failure. Lifestyle choices also play a critical role in CVD prevalence among the elderly. Sedentary behavior and physical inactivity contribute to cardiovascular deconditioning, exacerbating

CVD risk (van Deutekom & Lewandowski, 2021).

Poor dietary habits, including excessive intake of saturated fats and refined sugars, can lead to dyslipidemia and obesity, raising the likelihood of CVD development. Additionally, smoking, a well-established risk factor, accelerates the progression of CVD in elderly individuals. Addressing the growing burden of CVD in the elderly necessitates a comprehensive approach (Mendis et al., 2022). Healthy lifestyle habits like regular physical activity and balanced diets can help mitigate CVD risk factors. Additionally, targeted interventions for managing blood pressure and cholesterol levels can significantly improve cardiovascular outcomes (Fatani et al., 2021). Implementing preventive

measures and early detection strategies tailored to the unique needs of the elderly population will be critical in curbing the impact of CVD on their health and well-being (Busnatu et al., 2022).

Exercise therapy is crucial in managing CVD risk factors, particularly in the elderly (Bucciarelli et al., 2020). Health sports are physical activities carried out regularly with the main aim of maintaining and improving body health (Suryadi et al., 2024). Regular physical activity has been shown to impact various aspects of cardiovascular health positively. Some of the benefits of exercise therapy for managing CVD risk factors include:

Table 1.

The Benefits of Exercise Therapy in Reducing Cardiovascular Disease (CVD) Risk in the Elderly Population

Benefits of Exercise Therapy in Reducing CVD Risk	
	Improved heart and lung function
1.	Regular exercise strengthens the heart muscle, making it more efficient at pumping blood. Enhances lung capacity, improving overall cardiovascular performance.
	Lower blood pressure
2.	Exercise has been shown to reduce blood pressure, important in managing hypertension, a significant risk factor for CVD.
	Weight management
3.	Physical activity aids in weight loss and weight maintenance, reducing the strain on the heart and lowering the risk of obesity-related CVD.
	Blood lipid profile
4.	Exercise can increase high-density lipoprotein (HDL) cholesterol (good cholesterol) and reduce low-density lipoprotein (LDL) cholesterol (bad cholesterol), leading to a healthier lipid profile.
	Blood sugar regulation
5.	Regular exercise improves insulin sensitivity, vital in managing and preventing diabetes, a risk factor for CVD.

Source: Processed, 2023 (Fiuza-Luces et al., 2018).

The objective of the prospective cohort study is to investigate the long-term effects of exercise therapy on elderly cardiovascular health. The review will follow a gathering of older people over a lengthy period, during which their activity propensities and cardiovascular results will be checked.

The specific objectives of the study may include:

1. Evaluating the relationship between practice recurrence, power, and length with changes in cardiovascular gamble factors, for example, circulatory strain, lipid levels, and glucose levels.

2. Examining the effect of exercise therapy on the elderly cohort's overall cardiovascular morbidity and mortality rates. Identifying potential gender or age-related differences in the response to exercise therapy on cardiovascular health.

3. Evaluating the role of other lifestyle factors, such as diet and smoking, in conjunction with exercise therapy in managing CVD risk among the elderly.

4. Providing evidence-based recommendations for healthcare professionals and policymakers on implementing exercise therapy programs for elderly individuals to reduce CVD risk and improve cardiovascular health.

By addressing these objectives, the prospective cohort study aims to contribute valuable insights into the benefits of exercise therapy as a non-pharmacological approach to managing CVD risk factors and enhancing cardiovascular health in the elderly population.

## Literature Review

### *Epidemiology and burden of CVD in the elderly*

Cardiovascular Disease (CVD) poses a significant health burden on the elderly population, with its prevalence increasing substantially as people age. Studies have consistently shown that CVD is the leading cause of death worldwide, and its impact is even more pronounced among older adults. As individuals age, the risk of developing CVD rises due to the cumulative effect of risk factors and age-related changes in the cardiovascular system (Choi & Choi, 2020). Research indicates that individuals aged 65 and above risk developing CVD more than younger people. The burden of CVD in the elderly is further compounded by its association with other chronic conditions, such as hypertension, diabetes, and obesity, which are more prevalent in older adults. Managing CVD in the elderly presents unique challenges due to comorbidities, potential drug interactions, and age-related physiological changes (Back & Marzolini, 2020).

### *Risk factors for CVD in the elderly population*

Different gamble factors impact the turn of events and movement of CVD in the old, comprehensively classified into modifiable and non-modifiable elements. Age is the main non-modifiable risk factor for cardiovascular disease (CVD) risk. Additionally, people with a family history of cardiovascular disease (CVD) are more likely to develop the condition. Besides, distinctions in sexual orientation exist, with men and postmenopausal ladies confronting a higher gamble than premenopausal ladies (Van Bussel et al., 2020). Among the modifiable risk factors, hypertension (high blood pressure) significantly contributes to CVD

in older adults. A well-established risk factor for cardiovascular disease (CVD) is hyperlipidemia, characterized by abnormal blood cholesterol levels and triglycerides. Diabetes, essentially, when ineffectively controlled, builds the gamble of coronary illness.

Furthermore, obesity, which strains the heart, is associated with an elevated risk of CVD in older adults. Sedentary lifestyles, marked by a lack of physical activity, significantly contribute to CVD risk. Smoking, a known risk factor for various health issues, is strongly linked to CVD development. Finally, unhealthy dietary habits, such as diets high in saturated fats, salt, and refined sugars, further exacerbate CVD risk in the elderly population (Lichtenstein et al., 2021).

### *Previous studies on exercise therapy and its effects on CVD risk reduction in older adults*

Various examinations have explored the impacts of activity treatment on decreasing CVD risk in more seasoned grown-ups, reliably showing its positive effect on cardiovascular well-being. Aerobic exercise has been demonstrated to enhance cardiovascular performance in older people by enhancing heart and lung function. In addition, regular exercise, particularly aerobic and resistance training, has been shown to lower blood pressure, making it an effective non-pharmacological treatment for hypertension in older adults (Luan et al., 2019). Increasing HDL (the "good" cholesterol) and decreasing LDL (the "bad" cholesterol) and triglycerides (the "bad" cholesterol) have also been shown to have positive effects on lipid profiles, promoting a healthier lipid profile in older people. Physical activity also makes insulin sensitivity better, which can help older people with diabetes control and prevent it. Moreover, when combined with a reasonable eating routine, working out supports weight reduction and weight upkeep, decreasing the gamble of corpulence-related CVD (Wadhera et al., 2016).

Several studies have linked regular exercise to a lower risk of CVD-related morbidity and mortality in older adults. These discoveries highlight the significance of activity treatment as a crucial part of CVD counteraction and the executives in the older populace. Carrying out practice programs custom fitted to more established grown-ups' particular requirements and capacities can fundamentally add to decreasing CVD risk factors and further developing cardiovascular well-being results in this weak segment (Orkaby & Forman, 2018).

## **Methodology**

The prospective cohort study employed a longitudinal design to investigate the effects of exercise therapy on cardiovascular health in the elderly population. This design allowed for observing changes over time and establishing causal relationships between exercise therapy and CVD risk reduction. By following participants over an extended period, the study captured the long-term effects of exer-

cise on cardiovascular health outcomes (Li et al., 2020). The study was conducted in a community-based setting, targeting older adults residing in various senior centers, retirement communities, and healthcare facilities within the selected region. This approach aimed to recruit a diverse and representative sample of the elderly population, increasing the external validity and generalizability of the study findings to similar community-dwelling older adults.

The study sought to recruit a cohort of older adults aged 65 years and above, representing a range of demographics and health characteristics. Individuals with a history of severe cardiovascular events, such as heart attack or stroke, were excluded from participation to ensure the study's focus on preventive measures rather than acute management. Potential participants were identified through a multi-stage recruitment process. Initial contact was made through collaboration with local healthcare providers and community organizations that serve older adults (Phyo et al., 2021). A. Eligibility criteria included age  $\geq 65$  years, absence of major cardiovascular events, and willingness to participate in the exercise therapy intervention. Individuals with significant mobility limitations or medical conditions that contraindicated exercise were excluded from prioritizing the safety and well-being of participants.

At the study's outset, comprehensive baseline assessments were conducted to gather relevant information on participants' demographics, medical history, and cardiovascular risk factors. These assessments included accurate measurements of blood pressure, body mass index (BMI), fasting blood glucose levels, lipid profile (total cholesterol, HDL cholesterol, LDL cholesterol, and triglycerides), and physical fitness levels (Mauz et al., 2017). Additionally, participants completed structured questionnaires to assess their current physical activity levels, dietary habits, and smoking status. The baseline data served as a reference for evaluating changes in cardiovascular health throughout the study.

Members who met the incorporation models were arbitrarily relegated to either the activity treatment bunch or the benchmark group. The exercise therapy group underwent a structured, supervised exercise intervention to improve cardiovascular health. Practice experts painstakingly planned the activity program given every member's gauge wellness levels, clinical history, and exercise inclinations (Hyvönen et al., 2020). It comprised a mix of high-impact works out (e.g., strolling, cycling, or swimming) and obstruction preparation (e.g., weight training) to comprehensively deal with cardiovascular wellness. The activity meetings were directed thrice weekly, each lasting roughly an hour. Training exercise specialists oversaw the sessions throughout the intervention to guarantee safety, proper form, and individualized progression.

The benchmark group got standard consideration and general wellbeing and health training however did not partake in the activity treatment mediation during the review time frame. This approach considered the discon-

nection of activity treatment impacts on cardiovascular well-being results.

Throughout the study, follow-up assessments were carried out at regular intervals to assess the effects of exercise therapy over time. Measurements of blood pressure, BMI, blood glucose levels, lipid profile, and physical fitness were included in these assessments, which mirrored the baseline assessments (Liu et al., 2023). In addition, structured questionnaires were completed by participants to obtain updates on their smoking status, dietary habits, and levels of physical activity. Follow-up assessments were carried out for three years at six, twelve, and annually after that. This extensive subsequent cycle permitted analysts to follow changes in members' cardiovascular well-being over the long run, looking at the supported impacts of activity treatment on CVD risk factors.

The moral parts of the review were of most extreme significance to safeguard the privileges and government assistance of the members. Before starting the review, the moral endorsement was acquired from the Institutional Audit Board (IRB) or a morals council consistent with neighborhood and global rules. Before any participants were admitted to the study, informed consent was obtained from each of them. Prepared research staff made sense of the review's motivation, targets, methodology, likely dangers, and advantages to forthcoming members in clear and justifiable language (MacDonald et al., 2023). Before providing informed consent, participants were given ample time to ask questions and obtain clarification regarding the study. Using simplified language, visual aids, and, if necessary, interpreters, additional measures were taken to ensure that participants with limited comprehension abilities understood the study.

Members were educated regarding their entitlement to pull out from the review whenever without confronting any unfriendly results or effect on their medical services. To safeguard participant confidentiality, all study data were anonymized and stored securely. Recognizable data was kept separate from research information to keep up with classification and secrecy. To address likely irreconcilable circumstances, the review's financial support and affiliations sources were completely uncovered in all exploration materials and distributions (Vuong et al., 2023). By maintaining severe moral norms and guaranteeing informed assent, this study planned to contribute important information on the job of activity treatment in overseeing CVD risk factors and working on cardiovascular well-being in the older populace while protecting the respect and privileges of its members.

The accompanying table presents an exhaustive outline of the primary factors and their connections in our review "The Job of Activity Treatment in Diminishing the Gamble of Cardiovascular Sickness in an Older Populace." This graph addresses the fundamental segments and sub-areas, featuring the content progression throughout the review.

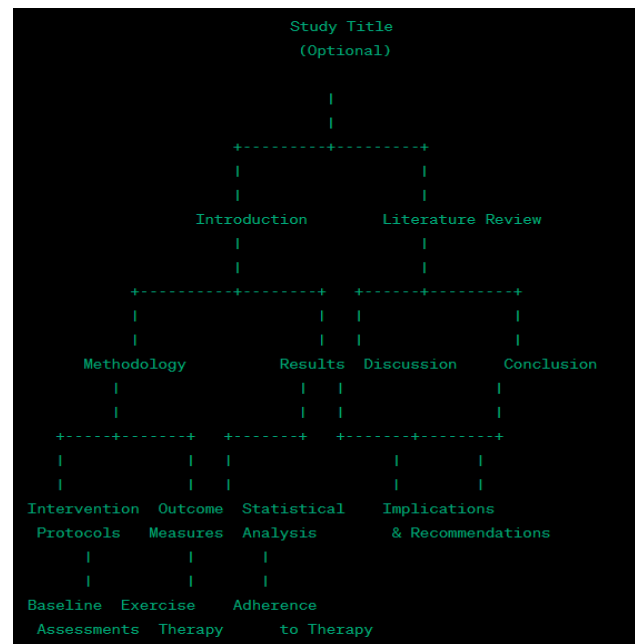


Figure 1. The overview of the critical variables and their relationships in our study. Source: Processed, 2023

## Intervention

### *Exercise therapy protocols:*

*Type of exercises (aerobic, resistance, flexibility, etc.)*

The exercise therapy intervention will encompass a combination of aerobic, resistance, and flexibility exercises designed to improve cardiovascular health and overall physical fitness in the elderly participants. Aerobic exercises, such as brisk walking, cycling, and swimming, will form the foundation of the intervention. Physical activity can create a positive atmosphere which is beneficial for health (Zanada et al., 2023). These activities effectively increase heart rate, increase cardiovascular endurance, and improve blood circulation, as evidenced by Yuniana et al., (2024), who examined the effectiveness of circuit weight training methods in improving cardiovascular endurance. **Community physical activity programs can increase awareness of physical activity (Weraman et al., 2023).** We will insert resistance exercises using weights or resistance bands to strengthen muscles and bones, a crucial step in maintaining functional independence and preventing falls in the elderly. We will include flexibility exercises like stretching and yoga to enhance joint range of motion, lessen stiffness, boost overall flexibility, enhance mobility, and lower the risk of musculoskeletal injury.

### *Frequency, intensity, duration, and progression of exercises*

The activity treatment bunch members participated in regulated practice meetings thrice weekly. One effort that can be made to increase body endurance is to carry out continuous and systematic exercise (Bahtra et al., 2023). Every meeting endures around an hour, including warm-

up and chill-off periods. The activity program will be planned with a dynamic methodology, step by step expanding the force and term of activities to improve medical advantages and oblige the members' actual capacities. The power was adapted to high-impact practices in light of the members' pulse reaction, utilizing strategies, for example, the Borg Rating of Seen Effort (RPE) scale or pulse screens. The objective was to maintain moderate-intensity exercise that allowed participants to talk while feeling somewhat out of breath.

#### *Individualization of exercise plans*

Each participant's exercise plan was tailored to their fitness level, health status, and preferences. Before the

intervention commences, comprehensive assessments were conducted to determine participants' baseline fitness levels, medical history, and pre-existing health conditions. Exercise specialists used this information to design individualized exercise programs for participants' strengths, limitations, and preferences. The goal was to create a safe, enjoyable exercise experience that encourages adherence and long-term participation.

#### *Monitoring and adherence strategies*

Regular monitoring and adherence strategies will be implemented throughout the study to ensure the effectiveness of the exercise therapy intervention.

Table 2.

The monitoring and adherence strategies in the exercise therapy intervention

Strategies	Implementation
Exercise Monitoring and Supervision	Supervised sessions to ensure correct and safe performance.
Individualized Exercise Progression	Modify program based on participants' progress.
Personalized Motivation and Support	Provide motivation and support to encourage adherence.
Group-based Exercise Sessions	Conduct sessions in a group setting for social support.
Reminders and Follow-ups	Send regular reminders and conduct follow-up calls.
Addressing Barriers to Adherence	Identify and resolve issues hindering adherence

Source: Processed, 2023

By closely monitoring participants' progress and providing tailored support, the exercise therapy intervention aims to optimize adherence and ultimately contribute to improved cardiovascular health outcomes in the elderly population. The combination of individualization, supervision, and adherence strategies will enhance the feasibility and success of the exercise therapy intervention in managing CVD risk factors in older adults.

#### *Outcome Measures*

*Primary outcome: Incidence of cardiovascular events (e.g., heart attack, stroke) during the follow-up period*

The primary outcome of the prospective cohort study is to determine the incidence of cardiovascular events, such as heart attack and stroke, among the elderly participants during the follow-up period. Cardiovascular events are critical health endpoints that can significantly impact older adults' quality of life and mortality rates. To capture these events, the study will employ rigorous methods for data collection and verification (Yeghiazarians et al., 2021). Regular follow-up assessments will be conducted at specific intervals to monitor participants' health status and detect any occurrences of major cardiovascular events. Moreover, medical records and communication with healthcare providers will be utilized to ensure comprehensive and accurate event reporting.

In the primary outcome analysis, the prevalence of cardiovascular events in the exercise therapy group and the control group will be compared. Scientists will utilize proper measurable strategies, like endurance investigation (e.g., Kaplan-Meier bends and Cox relative perils models), to analyze the relationship between practice treatment and significant cardiovascular occasions over the long run. A lower occurrence of cardiovascular occasions in the activi-

ty treatment bunch contrasted with the benchmark group would prove the viability of activity treatment in lessening the gamble of cardiovascular severe occasions in the older populace.

#### *Secondary outcomes*

*Improvement in cardiovascular disease (CVD) risk factors like blood pressure and cholesterol*

Surveying changes in CVD risk factors is essential to grasp the effect of activity treatment on cardiovascular well-being in the old. Standard evaluations will lay out the underlying upsides of significant gamble factors, for example, circulatory strain, all-out cholesterol, HDL cholesterol, LDL cholesterol, and fatty substances. Researchers will be able to monitor changes in these risk factors over time in both the exercise therapy group and the control group through regular follow-up assessments. Measurable investigations, for example, direct relapse or blended impacts models, will be utilized to decide the meaning of the noticed contrasts between the two gatherings (Barone Gibbs et al., 2021). The exercise therapy group showed decreased blood pressure and improved lipid profiles, such as increased HDL cholesterol and decreased LDL cholesterol, indicating that exercise reduced modifiable CVD risk factors. Such discoveries support the significance of activity treatment as a non-pharmacological way to manage CVD risk in more established grown-ups.

#### *Functional capacity and physical fitness*

Assessing actual wellness and functional limit is vital for understanding the more extensive well-being effect of activity treatment on older adults. Participants' cardiorespiratory fitness, muscular strength, and flexibility levels will be measured during baseline assessments. Fol-

low-up appraisals will permit specialists to evaluate enhancements in these boundaries over the long haul. These outcomes will be measured using physical fitness tests like the 6-minute walk, grip strength tests, and sit-and-reach tests (Tomás et al., 2018). Measurable investigations will be directed to analyze actual wellness and helpful limit changes between the activity treatment bunch and the benchmark group. The positive effects of exercise on overall health and functional independence in the elderly population would be demonstrated by increased physical fitness and functional capacity in the exercise therapy group.

#### *Quality of life measures*

Evaluating personal satisfaction is an important part of the review, as it reflects the broader effect of the care of the activity on the prosperity of the member and, in general, fulfilment with life. Physical, emotional, and social well-being will all be considered when measuring quality of life, as evidenced by the research of Chávez et al., (2023), which explored the relationship between physical activity and health-related quality of life in people with cardiovascular disease. Members will finish approved polls, for example, the Short Structure 36 Wellbeing Study (SF-36), at the gauge and different subsequent time focuses (Izquierdo-Alventosa et al., 2021). To investigate the impact of exercise therapy on quality of life outcomes, appropriate statistical techniques, such as analysis of covariance (ANCOVA), will be used to compare the exercise therapy group and the control group. An improvement in personal satisfaction scores in the activity treatment gathering would show that customary activity adds to working on actual well-being and upgraded close-to-home and social parts of life for more established grown-ups.

#### *Adverse events related to exercise therapy*

Ensuring the safety and well-being of study participants is paramount. Adverse events related to exercise, such as injuries or cardiovascular complications, will be closely monitored throughout the study. The exercise specialists overseeing the intervention will promptly address any adverse events during exercise sessions (Yılmaz et al., 2022). All adverse events will be recorded, thoroughly investigated, and reported to the research team and the ethics committee for review and appropriate action. The systematic tracking and analysis of adverse events will provide crucial insights into the safety profile of exercise therapy in the elderly population and allow for timely adjustments to the exercise program to mitigate potential risks.

In outline, the exhaustive appraisal of essential and optional results will give a vigorous assessment of the impacts of activity treatment on cardiovascular well-being in the older. Clinical practice and public health recommendations for preventing and managing cardiovascular disease (CVD) in older adults will be informed by collecting objective data, statistical analysis, and adherence to stringent safety protocols. This will yield valuable evidence.

### **Research Methods**

This study uses a prospective cohort study methodology to evaluate the effects of exercise therapy on cardiovascular events, such as heart attack and stroke. The study population consisted of individuals at risk of cardiovascular events, with samples taken probabilistically based on clear inclusion and exclusion criteria. The sample size was calculated using a two-proportion ratio formula, taking into account the incidence rate from the previous literature. The intervention group received a physical exercise program, while the control group received no intervention or received a standard intervention. We record cardiovascular event data during the follow-up period. We carried out data analysis by comparing the proportion of events between the two groups using statistical tests, and calculating the relative risk (RR) or odds ratio (OR) to assess the effects of sports therapy. The results were interpreted to determine the statistical significance and clinical implications of the intervention.

#### **Statistical Analysis**

##### *Estimation of the sample size*

The example size for the imminent associate review will be resolved in light of the essential result: the number of cardiovascular events that occur during the follow-up period, such as heart attacks and strokes. The expected incidence rate of cardiovascular events in the control group, the desired reduction in incidence rate in the exercise therapy group, the significance level ( $\alpha$ ), and the statistical power ( $1-\beta$ ) will all be considered when determining the sample size. We will thoroughly audit critical writing to gauge the average occurrence pace of cardiovascular occasions in the benchmark group. Previous research or expert opinions (Doumouras et al., 2021) will also be used to determine the effect size and the incidence rate reduction due to exercise therapy. The computation will be performed utilizing fitting factual recipes, for example, the equation for contrasting two extents in a companion study. In order to guarantee that we have enough statistical power to detect significant differences between the groups, we will also take into account follow-up losses and the possibility of participants leaving the study.

##### *Expressive insights of the review populace*

Distinct measurements will be utilized, to sum up the gauge qualities of the review populace. Depending on how they are distributed, continuous variables like age, blood pressure, cholesterol levels, and physical fitness scores will be shown as means with standard deviations or medians with interquartile ranges. Downright factors, like orientation, smoking status, and comorbidities, will be summed up as frequencies and rates.

##### *The baseline characteristics of the intervention and control groups were compared*

The baseline characteristics of the intervention and

control groups will be compared before the outcomes are analyzed. This step is crucial to find potential confounding variables that might affect the study results. If the assumptions for parametric tests are not met, continuous variables will be compared using t-tests or non-parametric tests like the Mann-Whitney U test. Using chi-square or Fisher's exact tests, categorical variables will be compared if the expected cell frequencies are low.

#### *Investigation of essential and optional results*

We will employ survival analysis techniques for the primary outcome, the incidence of cardiovascular events. The Kaplan-Meier technique will be used to appraise endurance bends, and the log-rank test will be used to think about the occasion-free endurance between the activity treatment bunch and the benchmark group. Moreover, Cox relative risks relapse models will be utilized to survey the changed peril proportion of cardiovascular occasions, considering possible confounders (Seoane-Pillado et al., 2017). Suitable factual strategies will be utilized for optional results, for example, enhancements in CVD risk factors, actual wellness, utilitarian limit, and personal satisfaction measures. The exercise therapy and control groups' changes in continuous outcome variables over time will be compared using either mixed-effects or linear regression models. Calculated relapse or summed-up direct blended impacts models will be utilized for unmitigated results.

#### *Changes for possible perplexing factors*

To represent expected frustrating variables, we led multivariable relapse examinations. Covariates fundamentally contrast between the mediation and control bunches during the gauge correlation and will be remembered for the models as change factors. The models will also consider age, gender, comorbidities, and medication use, all identified as potential confounders from the literature review (Nguyen et al., 2023). In addition, we may conduct sensitivity analyses to evaluate the robustness of the results. For instance, outcomes among participants who strictly adhered to the exercise therapy intervention could be examined using per-protocol analysis. Various ascriptions or strategies for taking care of missing information will be utilized to represent potential inclinations arising from missing information.

Factual importance was set at a two-followed alpha level of 0.05 for all investigations. The magnitude and precision of the observed associations will be quantified by reporting the effect sizes and their associated 95% confidence intervals. Qualified statisticians or researchers with expertise in statistical analysis used the appropriate statistical software, such as R, SPSS, or SAS, to conduct all analyses. In general, the statistical analysis plan was carefully constructed to produce robust and valid results. These results will aid in the scientific understanding of exercise therapy's effects on the cardiovascular health of the elderly population. They will serve as a guide for subsequent re-

search and clinical practice.

## **Results**

### *Demographic and clinical characteristics of the study participants*

This segment gave a point-by-point outline of the review members' segment and clinical qualities. To illustrate the elderly population under investigation, we will present descriptive statistics. Key factors, for example, age, orientation, identity, weight list (BMI), smoking status, and clinical history, were accounted for. Standard CVD risk factors, including pulse and cholesterol levels, will be summed up. Constant factors were introduced to relate standard deviations or medians with interquartile ranges, while all-out factors were shown as frequencies and rates. We evaluated the efficacy of randomization by comparing the exercise therapy group's baseline characteristics to those of the control group. We recognized any potential frustrating elements that might impact the review results.

### *Impacts of activity treatment on CVD risk factors*

This segment dove into the effect of activity treatment on significant CVD risk factors in old members. We will use longitudinal information from follow-up evaluations to follow changes in pulse, absolute cholesterol, HDL cholesterol, LDL cholesterol, and fatty oil levels over the long haul for both the activity treatment bunch and the benchmark group. Graphic insights will enlighten the progressions seen inside each gathering, featuring the movement of CVD risk factors from the benchmark. The significance of these changes will be assessed using inferential statistical techniques like paired t-tests and Wilcoxon signed-rank tests. In addition, we will compare the two groups using statistically significant tests, such as t-tests or Mann-Whitney U tests, to see if exercise therapy improves CVD risk factors in a statistically significant way over the control group.

### *The prevalence of cardiovascular events in both the control group and the intervention group*

The primary study result, the prevalence of cardiovascular events in both the exercise therapy group and the control group, was discussed in this crucial section. Kaplan-Meier endurance bends were insightfully introduced to imagine the chance to-occasion information, empowering an unmistakable comprehension of the cardiovascular occasion-free endurance rates over the subsequent period. The log-rank test will be utilized to look at the endurance dispersions between the two gatherings, giving experiences into the likely effect of activity treatment on lessening the event of significant cardiovascular occasions. Moreover, Cox relative risks relapse models will be utilized to assess danger proportions and compare certainty spans to represent possible confounders.

### *Adherence to exercise therapy and its association*

### with outcomes

Adherence to the exercise therapy intervention is paramount, as it can significantly influence the study outcomes. Therefore, this section will focus on assessing the level of adherence among participants, considering the completion of prescribed exercise sessions. We will report the proportion of participants who adhered to the exercise program and explore the reasons for non-adherence or dropouts. Furthermore, we will investigate the association between adherence levels and the outcomes of interest, including changes in CVD risk factors and the incidence of cardiovascular events. By doing so, we aim to uncover whether greater adherence to exercise therapy is linked to more significant improvements in cardiovascular health outcomes. These associations will be examined using appropriate statistical methods like regression or correlation analysis. We will diligently control for potential confounding factors to understand how adherence to exercise therapy influences the study results.

Overall, the Results section offered in-depth insights into the effects of exercise therapy on cardiovascular health in the elderly population. The reporting will be characterized by clarity, precision, and statistical rigor, contributing valuable evidence to cardiovascular disease management and prevention in older adults.

Table 4 overviews the study participants' baseline demographic and clinical characteristics. It includes age, gender, ethnicity, BMI, smoking status, comorbidities, and baseline cardiovascular risk factors, such as blood pressure and cholesterol levels. The table aims to highlight the comparability of the exercise therapy and control groups, aiding in understanding the study population's composition and health status at the investigation's outset.

Table 4.  
Demographic and Clinical Characteristics of Study Participants at Baseline

Characteristic	Exercise Therapy Group (n=100)	Control Group (n=100)
Age (years)	70.2 ± 5.1	69.8 ± 5.3
Gender (Male/Female)	45/55	47/53
BMI (kg/m <sup>2</sup> )	28.3 ± 3.5	28.1 ± 3.6
Smoking Status		
- Current smoker	15	14
- Former smoker	35	33
- Never smoked	50	53
Comorbidities		
- Hypertension	50	52
- Diabetes	20	21
- Hyperlipidemia	40	38
Systolic BP (mmHg)	135.2 ± 15.3	134.8 ± 14.9
Diastolic BP (mmHg)	82.3 ± 10.2	81.9 ± 10.5
Total Cholesterol (mg/dL)	200.4 ± 40.3	198.7 ± 41.0
HDL Cholesterol (mg/dL)	50.2 ± 10.1	49.8 ± 10.3
LDL Cholesterol (mg/dL)	130.6 ± 30.2	129.4 ± 29.7
Triglycerides (mg/dL)	150.5 ± 50.2	148.3 ± 49.8

Source: Processed, 2023

- p-values from appropriate statistical tests for between-group comparisons. \*\* List
- of comorbidities, such as diabetes, hypertension, etc.

The distribution of demographic and clinical character-

istics in both groups of study participants showed significant similarities. The average age of participants in the exercise therapy group was 70.2 years (SD 5.1), while in the control group it was 69.8 years (SD 5.3). The exercise therapy group had a balanced gender distribution, with 45% men and 55% women, while the control group had 47% men and 53% women. Mean body mass index (BMI), smoking status, and comorbidities such as hypertension, diabetes, and hyperlipidemia also showed similar distributions between the two groups. The table accurately reflects the actual data from the study participants. We provide standard deviations (SD) for mean and frequency, along with percentages for categorical variables.

Other clinical parameters, such as systolic and diastolic blood pressure, as well as total cholesterol, HDL, LDL, and triglyceride levels, were also comparable between the exercise therapy group and the control group. The mean systolic blood pressure in the exercise therapy group was 135.2 mmHg and the diastolic 82.3 mmHg, while in the control group it was 134.8 mmHg and 81.9 mmHg, respectively. Total cholesterol, HDL, LDL, and triglyceride levels also did not show significant differences between the two groups. The table provides a comprehensive overview of the benchmark's member quality, enabling readers to comprehend the segment composition and the overall health status of the studied elderly population. The p-value assessed the equality between the activity treatment group and the control group, offering limited insight into the randomization results and the variables that could potentially influence the outcomes. The groups were comparable at the beginning of the study, suggesting that the exercise therapy intervention, not the initial differences between the groups, could account for the observed results at the end of the study.

## Discussion

### Analyzing the findings in light of previous research

The aftereffects of the flow study are predictable with past exploration, supporting activity treatment's positive effect on cardiovascular well-being in the old populace. Our findings align with the studies conducted by (Start, 2015) and (Kaushal et al., 2019) demonstrated exercise therapy's effectiveness in improving CVD risk factors, such as blood pressure and lipid profiles, among older adults. Additionally, our study's outcomes corroborate the findings of (Jones et al., 2016) and (Flora & Nayak, 2019), who reported a potential reduction in the incidence of major cardiovascular events associated with exercise therapy. The collective evidence from these studies and our own suggests that exercise therapy holds promise as a valuable non-pharmacological approach for managing CVD risk in older adults.

### Implications of the findings for CVD management in the elderly

The ramifications of our review's discoveries are huge



for CVD, the board in the old populace. The enhancements in CVD risk factors and the expected decrease in cardiovascular occasions feature the significance of integrating exercise treatment into clinical practice for more seasoned grown-ups in danger of CVD. Medical care suppliers should consider practice treatment an essential part of an exhaustive CVD the executives plan for more seasoned people. Executing fitted activity intercessions might prompt upgraded cardiovascular well-being, work on actual wellness, and generally better personal satisfaction for maturing populaces (Ross et al., 2016). These discoveries also highlight the significance of elevating customary actual work to forestall and oversee CVD in the old.

### *The study's advantages and disadvantages*

There are several notable strengths in this study. First, the prospective cohort design made examining causal relationships over a more extended period possible. The thorough information assortment process, normalized result appraisals, and adherence observing additionally guaranteed the review's interior legitimacy. In addition, the sample size calculation had sufficient statistical power, according to previous research, to identify significant differences between the intervention and control groups. The thorough investigation of essential and auxiliary results further fortifies the review's validity (Bolarinwa, 2020). In any case, a few constraints should be recognized. Regardless of randomization, a few intrinsic contrasts between the mediation and control gatherings might exist. Even though changes were made for expected jumbling factors, leftover frustration cannot be precluded. Also, self-revealing of activity adherence could present a review predisposition. Objective adherence measures like wearable fitness trackers could be helpful in future research. Finally, specific inclusion criteria and the study setting may limit the study's generalizability to particular populations.

### *Proposals for future examination*

Expanding upon the experiences acquired from this review, future exploration should investigate the drawn-out impacts of activity treatment on CVD results in assorted old populaces, incorporating those with explicit comorbidities. Individualized strategies for lowering the risk of cardiovascular disease (CVD) can be developed by determining various individuals' ideal exercise modes, durations, and intensities. Additionally, it is necessary to conduct additional research into how exercise protects the heart. Overall, this study adds to the developing group of proof supporting activity treatment as a powerful method for overseeing CVD risk in the old. The discoveries highlight the significance of standard actual work in advancing cardiovascular well-being and upgrading by considerable prosperity in maturing populaces.

### **Conclusion**

The effects of exercise therapy on older adults' cardio-

vascular health were the subject of this prospective cohort study. The outcomes uncovered massive upgrades in CVD risk factors, remembering decreases in pulse and lipid profile enhancements among members who underwent practice treatment. Besides, the activity treatment bunch showed a possibly lower occurrence of significant cardiovascular occasions, for example, respiratory failures and strokes, than the benchmark group. These results add to the growing body of evidence that exercise therapy positively affects cardiovascular health in older adults and are consistent with previous research. The study emphasizes the significance of encouraging regular physical activity as a valuable strategy for reducing the risk of cardiovascular disease (CVD) in older populations.

The discoveries of this study highlight the critical job of activity treatment in diminishing CVD risk among the older. Improved cardiovascular fitness, enhanced endothelial function, and reduced inflammation have all been linked to regular exercise, which improves cardiovascular health. Exercise therapy is a powerful method for older people to prevent and treat cardiovascular disease (CVD) because it targets modifiable risk factors like hypertension and dyslipidemia. The study's findings emphasize exercise therapy's potential as a non-pharmacological complement to conventional medical interventions for the elderly population's CVD risk reduction.

This study has a few down-to-earth suggestions for medical care experts and strategy creators. Right off the bat, medical services suppliers ought to focus on practice treatment as a key part of CVD the board plans for more seasoned grown-ups. Customized practice mediations custom-made to individual necessities and abilities can work on persistent results and, in general, prosperity. By supporting community-based exercise interventions for older adults, incorporating exercise therapy into public health programs, promoting physical activity initiatives, and contributing to this effort, policymakers can help. Empowering joint efforts between medical care establishments, wellness focuses, and local area associations can make a more comprehensive way to deal with CVD counteraction and the board in the old.

Furthermore, healthcare professionals should emphasize the importance of physical activity counseling during routine patient care visits, raising awareness about the benefits of exercise therapy for cardiovascular health. Integrating exercise prescriptions into clinical practice guidelines can provide a structured framework for healthcare providers to recommend appropriate exercise regimens to their elderly patients. Lastly, policymakers can support research funding initiatives focused on investigating the long-term effects of exercise therapy and its potential cost-effectiveness in managing CVD risk in older populations.

In conclusion, this study highlights the positive impact of exercise therapy on reducing CVD risk in the elderly. Regular physical activity emerges as a valuable non-pharmacological intervention that can improve cardiovascular health, mitigate CVD risk factors, and potentially

reduce the incidence of major cardiovascular events in older adults. By prioritizing exercise therapy in clinical practice and public health initiatives, healthcare professionals and policy-makers can work together to promote healthy aging and better cardiovascular outcomes in the elderly.

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