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Nutritional, Physical Activity, and Mental Health Interventions to Enhance Cardiovascular Health: A Scoping Review

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LITERATURE REVIEW

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ABSTRACT

Cardiovascular disease (CVD) remains the leading cause of mortality globally and in Indonesia, with rising incidence among younger populations due to modifiable risk factors such as poor diet, physical inactivity, and mental health issues. These lifestyle-related factors are increasingly prevalent, yet interventions addressing them are varied and dispersed across the literature. To explore recent nutritional, physical activity, and mental health interventions for the prevention of cardiovascular disease. This study used a scoping review design. Articles were obtained from six databases, EBSCO-host, CINAHL, PubMed, ScienceDirect, Scopus, Taylor and Francis, and Google Scholar, with the major keywords "dietary", "physical activity", "mental health", "cardiovascular disease", "prevention". Inclusion criteria included original studies, in English, published between 2015–2025, and the population reviewed was Adults / General population / High-risk individuals (e.g., aged >30, person with history of CVD). Data extraction followed the PRISMA-ScR guidelines. Twelve articles meeting the inclusion criteria showed intervention of prevention of cardiovascular disease. Physical activities such as walking, yoga, and exercise programs effectively improve cardiovascular health and physical fitness. Nutritional approaches like the Mediterranean diet help reduce cholesterol levels and blood pressure. Mental health practices, including meditation and stress management, contribute to lowering anxiety and blood pressure. This review emphasizes that integrating regular physical activity, a nutritious diet, and mental health support is essential for effectively preventing cardiovascular disease, with personalized approaches playing a key role in helping individuals maintain these healthy habits.

Key Messages:

- Physical activity interventions such as aerobic and resistance training, Nordic walking, and yoga effectively improve cardiovascular health, physical functional capacity (e.g., endurance, strength, and mobility), and quality of life across different age groups and health conditions.
- Healthy eating patterns, including the Mediterranean diet enriched with extra-virgin olive oil or nuts, as well as high-fiber, low-saturated fat diets, contribute to reducing cardiovascular risk by lowering cholesterol, blood pressure, and body mass index.
- Mental health strategies such as stress management, meditation, and online therapies like Emotional Freedom Technique (EFT) effectively reduce blood pressure, depression, and anxiety and enhance emotional well-being in high-risk cardiovascular patients.

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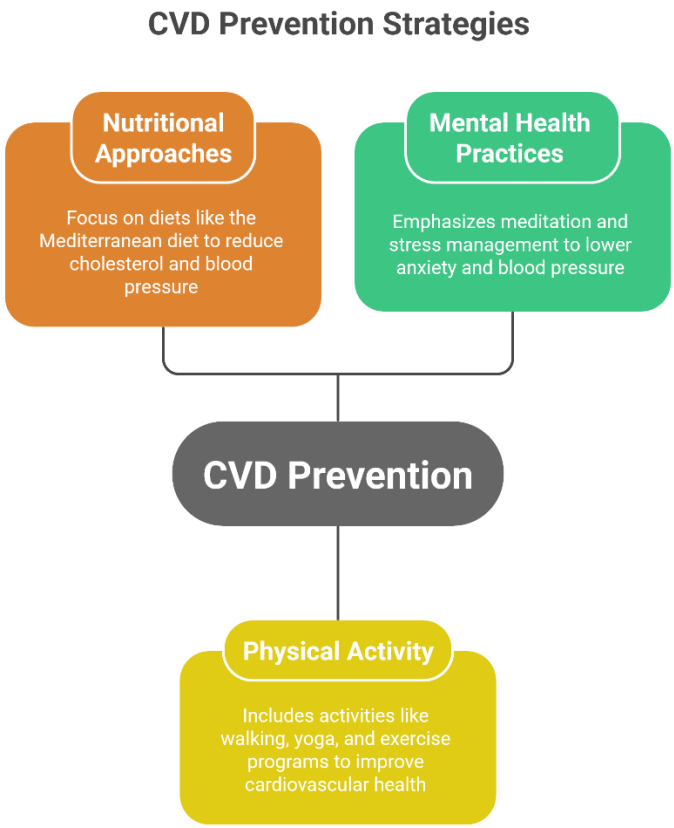
GRAPHICAL ABSTRACT



INTRODUCTION

Cardiovascular disease (CVD) refers to a group of conditions affecting the heart and blood vessels, including stroke, hypertension, heart failure, rheumatic heart disease, and peripheral artery disease(1). Globally, CVD is the leading cause of death, responsible for approximately 19.05 million deaths in 2020. In Indonesia, CVD accounts for over 650,000 deaths annually, with a significant proportion attributed to stroke, coronary heart disease, and hypertensive heart disease(1). Notably, the prevalence of CVD risk factors is increasingly observed among younger populations, indicating a shift in the disease burden toward the productive age group (2).

Risk factors for CVD can be divided into those that are non-modifiable, such as age, gender, ethnicity, and family history and those that are modifiable, including unhealthy dietary patterns, physical inactivity, smoking, and excessive alcohol consumption(3). The modifiable risks are closely linked to modern lifestyle changes: diets high in fat and sugar but low in fiber, coupled with sedentary behaviors, contribute to elevated blood pressure, blood glucose, cholesterol, and obesity (4). These lifestyle shifts are especially prominent among young adults and students, driven by technological advancements, urbanization, and changes in work and recreational habits(5)(6).

The prevalence of sedentary behavior in Indonesia has risen from 26.1% in 2013 to 33.5% in 2018, with young people and university students being the most affected groups(7). Factors contributing to this trend include academic demands, increased screen time, and limited opportunities for physical activity. Despite recommendations to engage in at least 150 minutes of moderate-intensity aerobic activity per week, many young adults fail to meet these guidelines, leading to a higher risk of developing CVD at a younger age(8).

Mental health is another critical factor in CVD prevention(9). Research shows that social isolation, stress, anxiety, and depression can significantly increase the risk of developing CVD(10). Poor psychological well-being may negatively influence health behaviors, such as unhealthy eating, lack of motivation to exercise, and increased substance use(11). Social support, self-efficacy, and stress management skills are essential in shaping effective preventive behaviors against CVD(12).

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The economic burden of CVD is substantial (13). In 2022, the cost of CVD treatment in Indonesia reached over IDR 12 trillion, reflecting a significant strain on the national healthcare system(13), This underscores the importance of primary prevention strategies that integrate nutritional interventions, promotion of physical activity, and mental health support. These approaches are interconnected and collectively contribute to reducing CVD risk and associated healthcare cost.

METHODS

Design

The design used in this research is a scoping review(14). This design has a more comprehensive conceptual scope to explain relevant research results (14). The scoping review framework consists of 5 core stages: identifying review questions, identifying relevant literature, selecting eligible studies or literature, extracting and mapping data, compiling, summarizing and reporting the results. The PRISMA Chart for Scoping Reviews (PRISMA-ScR) was used in this literature review to identify factors influencing primary prevention behaviors for cardiovascular disease1. The article selection process is presented in a PRISMA flowchart to ensure transparency and replication of the process (Figure 1).

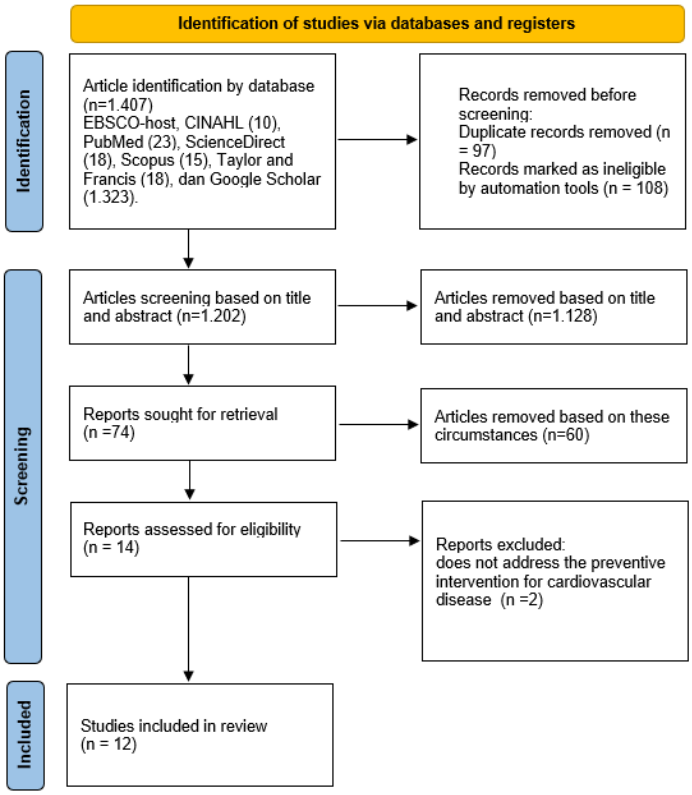

Figure 1. PRISMA Flow Diagram

Search Strategy and Inclusion Criteria

A scoping review was conducted on six leading databases, namely articles were identified through database searches, including EBSCO-host,CINAHL, PubMed, ScienceDirect, Scopus,Taylor and Francis, and Google Scholar. Six databases were chosen due to their comprehensive coverage of health and nursing literature. To ensure a comprehensive and systematic retrieval of relevant literature, the search strategy was adapted to the specific syntax and indexing structure of each database. The core strategy incorporated a combination of Medical Subject Headings (MeSH) and free-text terms related to cardiovascular disease prevention, physical activity, nutrition, and mental health. For example, in PubMed, the search query utilized MeSH terms such as “Cardiovascular Diseases/prevention and control,” “Exercise,” “Physical Fitness,” “Walking,” “Leisure Activities,” “Nutrition Therapy,” and “Mental Health,” combined using Boolean

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operators (AND, OR) to capture relevant intersections. In CINAHL and EBSCOhost, similar terms were applied using their respective subject headings, including “Cardiovascular Diseases/PC,” “Exercise,” “Diet,” and “Mental Health.” In ScienceDirect and Scopus, title-abstract-keyword (TITLE-ABS-KEY) searches were conducted using combinations of phrases such as “cardiovascular disease,” “physical activity,” “exercise,” “walking,” “nutrition,” and “mental health.” Taylor and Francis Online was searched using similar Boolean-structured keywords, while Google Scholar employed simplified phrase searches to account for its less structured search algorithm. The search was limited to articles published between January 2015 and May 2025, and restricted to English-language publications, and duplicates were managed through Mendeley. The search and selection procedures adhered to the PRISMA guidelines to ensure methodological transparency and replicability. The search query was tailored to the specific structure of each database. The overall process of searching and selecting articles adhered to the PRISMA guidelines to maintain systematic and transparent documentation. The literature screening process was conducted systematically in several stages to ensure the rigor and reliability of study selection. Initially, all search results were imported into Mendeley reference management software, where automatic detection and removal of duplicate records were performed. Following deduplication, a two-level screening was carried out. The first level involved title and abstract screening to exclude studies that clearly did not meet the inclusion criteria. The second level consisted of full-text screening to determine final eligibility based on the predefined scope and objectives of the review.

To maintain consistency and minimize selection bias, the screening process was independently conducted by two reviewers using a standardized screening protocol and eligibility checklist. Any discrepancies or disagreements during the screening stages were resolved through discussion, and if consensus could not be reached, a third reviewer was consulted. This structured and collaborative approach ensured transparency and enhanced the methodological rigor of the study selection process.

The central research question addressed in this study is: “What do recent studies indicate regarding the effectiveness of nutritional, physical activity, and mental health interventions in the primary prevention of cardiovascular disease?” Inclusion and exclusion criteria were established using the PCC (Population, Concept, Context) framework. The target population included adults either diagnosed with cardiovascular disease (CVD) or considered at high risk for CVD. The interventions examined were nutritional interventions, physical activity programs, and mental health care strategies. Comparisons were made against standard care, minimal counseling, or no intervention. Primary outcomes focused on clinical endpoints such as reduced recurrent CVD events and cardiovascular mortality, while secondary outcomes included improvements in risk factors (e.g., blood pressure, LDL cholesterol, BMI), behavioral changes (e.g., diet quality, physical activity), and adherence measures. Only original research articles published in English between 2015 and 2025 and directly relevant to CVD prevention behavior were included. Studies that were irrelevant, literature reviews, available only as abstracts without full-text access, or not specifically evaluating factors related to CVD prevention behavior were excluded. Applying these criteria ensured that the review analyzed only pertinent and high-quality studies.

Quality Appraisal

This study utilized Joanna Briggs Institute (JBI) critical appraisal tools to evaluate article quality (15). Review authors systematically assessed each included study using design-specific checklists: 8 items for randomized controlled trials (RCTs) and 4 items for quasy experiment study. Each checklist item was scored as "Yes" (1 point), "No/Unclear/Not Applicable" (0 points). Articles meeting ≥70% of the maximum possible score (calculated as [total score] ÷ [applicable questions]) were classified as good quality. Two independent reviewers conducted assessments, with discrepancies resolved through consensus discussions. Unresolved disagreements underwent adjudication by a third reviewer with systematic review expertise, ensuring methodological validity and minimizing selection bias throughout the appraisal process.

Data Extraction

The data extraction was conducted manually using a standardized form to guarantee uniformity and thoroughness in the information collected. The extracted data encompassed the author’s name, year

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of publication, study aims, research design, sample size and demographics, study location, type of spiritual-based intervention, and main findings concerning quality of life. To minimize bias and enhance reliability, two reviewers independently performed the data extraction. In cases where differences arose between reviewers, discussions took place, and a third reviewer was consulted as needed to achieve consensus. This approach was implemented to uphold data integrity and ensure that the information accurately reflected the outcomes reported in each study.

Data analysis

The scoping review employed a descriptive and thematic analytical approach, guided by the Arksey and O'Malley methodological framework as enhanced by Levac DHCKKO (2021) (16). Following data extraction, researchers systematically charted key information from each study—including study characteristics, population details, core concepts, interventions/behaviors investigated, and reported outcomes. This information was then organized into thematic categories to identify recurring patterns and trends across the literature. The analysis was conducted iteratively, allowing emerging themes to be refined throughout the process. The review team performed thematic categorization collaboratively and manually to maintain consistency and precision. Importantly, this approach focused not on evaluating individual study quality, but on synthesizing evidence to map the research landscape, spotlight concentrated areas of inquiry, and reveal knowledge gaps. Final findings are presented narratively with supporting summary tables, providing a clear overview of current knowledge distribution within the field.

RESULTS

A total of 74 articles were sought for full-text retrieval. Of these, 60 were excluded due to the following reasons: irrelevant population (n = 18), lack of intervention focus (n = 15), outcomes not related to cardiovascular disease prevention (n = 12), not original research (e.g., reviews or editorials) (n = 9), and unavailable full text (n = 6). Of the remaining 12 full-text articles assessed for eligibility, four were further excluded because they did not specifically discuss any intervention. Ultimately, 12 articles met the inclusion criteria and were included in the final review. Data extraction and quality assessment were conducted for all included studies, which examined dietary interventions, physical activity, lifestyle changes, and mental health interventions related to cardiovascular disease (CVD) prevention. To ensure methodological transparency, all included studies (n=12) underwent critical appraisal using the appropriate Joanna Briggs Institute (JBI) critical appraisal checklists based on their respective study designs. The complete results of the quality assessment are presented in Table 1 within the Results section, detailing item-by-item evaluations for each study. All studies demonstrated a quality score exceeding 70%, indicating satisfactory methodological rigor and supporting their eligibility for inclusion in the final synthesis. The consistently high quality of the included literature enhances the validity of the synthesized findings. Collectively, the evidence underscores the multifactorial nature of cardiovascular disease (CVD) prevention, emphasizing the necessity of comprehensive, multi-level strategies that integrate nutritional, physical activity, and mental health interventions across diverse population groups.

Physical Activity Interventions

Research demonstrates that structured physical activity programs can yield significant health benefits for diverse populations. Migueles JH (2023) (17) found that a 20-week regimen combining aerobic and resistance training among overweight or obese children in Spain led to notable reductions in cardiometabolic risk, LDL cholesterol, body mass index, fat mass, and visceral adipose tissue, alongside improved cardiorespiratory fitness, though mental health outcomes remained unchanged. Among adults with coronary artery disease, interventions such as high-intensity interval training (HIIT), Nordic walking, and moderate-to-vigorous continuous training (MICT) were all effective in boosting functional capacity, alleviating depression, and enhancing quality of life, with Nordic walking showing the most pronounced improvement in functional capacity (18). Additionally, a year-long yoga program for adults with metabolic syndrome in Hong Kong resulted in significant reductions in waist circumference and a trend toward lower systolic blood pressure (19). Furthermore, Masa-Font R (2015) (20) reported that a combined physical activity and dietary education intervention for patients with severe mental disorders in Spain improved

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physical measures such as walking capacity and physical quality of life; however, improvements in social and emotional function were more evident in the control group. These findings underscore the value of tailored physical activity interventions in promoting cardiovascular and metabolic health across different age groups and health conditions.

Dietary Interventions

Various dietary approaches have proven effective in lowering cardiovascular risk across different populations. Estruch R (202) (21) demonstrated that, among high-risk individuals in Spain, following a Mediterranean diet enriched with either extra-virgin olive oil or nuts led to a substantial decrease in the likelihood of major cardiovascular incidents when compared to a traditional low-fat diet. Similarly, Han K (2022) (22) reported that Chinese participants adopting the Guangxi longevity diet characterized by high fiber, low energy, low fat, low protein, and low cholesterol intake experienced notable reductions in body weight, BMI, blood pressure, total cholesterol, and LDL, alongside increased HDL and beneficial changes in gut metabolism. In Norway,(23) found that substituting saturated fatty acids with polyunsaturated fatty acids (specifically n-6 PUFA) resulted in lower LDL, total cholesterol, and triglyceride levels, as well as improved plasma metabolic profiles. Additionally, research by Sharma N (2024) (24) in India highlighted that adhering to healthy eating patterns such as the Mediterranean or DASH diets, combined with regular physical activity, was strongly linked to a decreased risk of heart disease.

Mental Health Interventions

A range of mental health interventions has demonstrated positive effects on cardiovascular risk and overall well-being. Bergum H (2022) (25) implemented a comprehensive multimodal lifestyle program for high-risk adults in Norway, which combined nutrition guidance, physical activity, smoking cessation support, stress management strategies, and goal setting. Their results showed significant reductions in cardiovascular risk scores, the prevalence of daily smokers, metabolic syndrome, and cardiovascular events, with stress management highlighted as a particularly important component. Similarly, Vitorino Monteiro A (2023) (26) found that a four-month meditation program for coronary artery disease patients in Portugal led to notable decreases in depression, anxiety, and stress, while also enhancing emotional quality of life. In Indonesia, Sirait HS (2022) (27) reported that online-based Emotional Freedom Technique (EFT) therapy was effective in lowering blood pressure among hypertensive patients. Additionally, Masa-Font R (2015) (20) noted that while their intervention primarily targeted physical activity and dietary habits, it also incorporated support from mental health and primary care teams, thereby providing psychosocial assistance; interestingly, however, improvements in social and emotional function were more pronounced in the control group. Collectively, these findings underscore the value of integrating mental health strategies within broader lifestyle interventions to optimize cardiovascular outcomes and patient well-being.

Table 1. Research Findings

Theme	References	Explanation
Physical Activity	(18)(20)(19)(17)	Reduced cardiometabolic risk, improved fitness, functional capacity, and quality of life
Dietary Intervention	(22), (21), (24), (23)	Lowered cardiovascular events, improved lipid profiles, weight loss, reduced blood pressure
Mental Health Intervention	(25),(27),(26), (20) (28)	Reduced stress, anxiety, depression, blood pressure; improved quality of life and psychosocial health.

DISCUSSION

Recent research confirms that structured lifestyle interventions—including physical activity, a healthy diet, and mental health management are highly effective approaches for the prevention of cardiovascular disease (CVD) (18),(24),(23),(25),(20), Exercise plays a crucial role in improving metabolic and vascular function by enhancing insulin sensitivity, lowering LDL levels, and improving body composition, particularly reducing visceral fat (18)(20)(19). In addition, physical activity increases nitric

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oxide production, which promotes vasodilation, and reduces blood pressure and systemic inflammation by lowering CRP and TNF-α levels (29). Beyond physical benefits, exercise such as HIIT and Nordic walking has also been shown to improve quality of life and reduce depressive symptoms in patients with coronary heart disease (18).

Interventions such as high-intensity interval training (HIIT) and Nordic walking have gained increasing attention as effective and accessible strategies for improving cardiovascular health, particularly in populations at risk of or living with cardiovascular disease (CVD). High-Intensity Interval Training (HIIT) involves short bursts of vigorous activity alternated with periods of rest or low-intensity exercise. This format has been shown to produce substantial improvements in cardiorespiratory fitness (VO_2 max), which is a strong predictor of cardiovascular morbidity and mortality. By pushing the cardiovascular system to adapt to repeated bouts of high demand, HIIT enhances myocardial efficiency, increases stroke volume, and improves endothelial function, which collectively contribute to better circulation and lower blood pressure. Additionally, HIIT significantly improves insulin sensitivity and reduces visceral adiposity, both of which are major contributors to metabolic syndrome and atherosclerosis.

HIIT has also been associated with reductions in resting heart rate and inflammatory biomarkers, such as interleukin-6 (IL-6) and CRP, further reducing the burden of chronic inflammation that drives CVD progression. Nordic walking, a form of physical activity that incorporates the use of specially designed poles, offers a full-body aerobic workout that is particularly effective for older adults or those with limited mobility due to its low-impact nature. Unlike regular walking, Nordic walking engages the upper body, which leads to greater energy expenditure, improved posture, and enhanced muscle strength across multiple groups. Studies show that Nordic walking significantly improves functional capacity, lowers systolic and diastolic blood pressure, and contributes to weight loss, especially in overweight individuals. It also improves lipid profiles by increasing HDL (good cholesterol) and lowering triglycerides. Importantly, Nordic walking has been associated with improved mood and reduced depressive symptoms, which indirectly supports cardiovascular health by promoting better adherence to lifestyle changes and reducing stress-induced sympathetic activity.

Both HIIT and Nordic walking also contribute to improved vascular compliance and reduced arterial stiffness, which are critical for preventing hypertension and maintaining healthy blood flow. Their ability to be adapted for different age groups and fitness levels makes them scalable public health interventions for CVD prevention and rehabilitation. These forms of exercise not only deliver measurable improvements in cardiovascular function but also enhance overall quality of life, empowering individuals to maintain long-term heart-healthy behaviors.

Psychological stress, depression, and anxiety have been shown to trigger similarly (30), diet plays a significant role in regulating lipid profiles, blood pressure, and inflammatory responses through the intake of unsaturated fats, fiber, and antioxidants (22) (31). Dietary patterns like the Mediterranean and DASH diets have been proven to reduce cardiovascular risk by lowering cholesterol, body weight, and improving gut microbiota metabolism (22),(21),(24). Plant-based diets are even associated with reductions in LDL by up to 10% and total cholesterol by 7%, which lowers the risk of atherosclerosis (32).

On the other hand, mental health is also critical in CVD prevention activation of the sympathetic nervous system and the HPA axis, increasing cortisol levels and blood pressure, and accelerating inflammatory processes and atherosclerosis(11). Moreover, mental health disorders often lead to unhealthy behaviors such as smoking, poor diet, and physical inactivity, indirectly increasing the risk of CVD (10). Interventions such as meditation (25), mindfulness-based stress reduction (MBSR) (27), and cognitive-behavioral therapy (CBT) (26)have been proven to lower blood pressure, improve heart rate variability, and enhance emotional regulation and therapy adherence (20).

Physical activity, diet, and mental health are the three key components of an integrated, multimodal intervention approach. The results demonstrate a greater synergistic effect compared to single interventions (33). However, since individual responses are strongly influenced by genetic, social, cultural, and psychological factors, a personalized approach is essential. Digital and social support also contribute to improved adherence to lifestyle changes (34). Therefore, a holistic and sustainable healthy lifestyle approach is a primary strategy for the prevention and management of cardiovascular disease across diverse

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population.

One of the main findings in the prevention of cardiovascular disease is the effectiveness of structured physical activity interventions in overweight or obese children. A 20-week exercise program combining aerobic and resistance training significantly reduced various cardiometabolic risk indicators (35). The study results recorded a decrease in LDL cholesterol levels, body mass index (BMI), fat mass, and visceral adipose tissue, as well as an increase in cardiorespiratory fitness. Nevertheless, these findings emphasize the importance of implementing structured physical activity as an effective preventive strategy from an early age in reducing cardiovascular risk factors and improving the physical health of vulnerable children (36).

In the adult population with coronary artery disease, physical activity interventions have shown significant positive effects on functional capacity and quality of life. Various forms of exercise such as high-intensity interval training (HIIT), Nordic walking, and moderate-to-vigorous continuous training (MICT) are effective in improving physical functional ability, reducing depression levels, and improving overall quality of life (37). Among the methods applied, Nordic walking showed the most prominent improvement in functional capacity, making it a very beneficial exercise alternative for patients with certain limitations. These findings underline the importance of selecting the type of exercise that is tailored to the clinical condition and individual patient preferences, in order to maximize rehabilitation outcomes and support the cardiovascular recovery process holistically (38).

A healthy diet is a key component in the prevention of cardiovascular disease. Strong evidence that a Mediterranean diet enriched with extra virgin olive oil or nuts significantly reduces the incidence of major cardiovascular events, compared with a conventional low-fat diet (39). These findings highlight that the quality of the types of food consumed has a greater impact on heart health than simply limiting total fat intake. The healthy fats, antioxidants, and fiber content of the Mediterranean diet are thought to provide protection against the inflammatory processes and metabolic dysfunction that underlie many cardiovascular diseases (37). The success of dietary interventions is not limited to Western approaches such as the Mediterranean diet, but is also reflected in traditional dietary practices of various cultures. The Guangxi longevity diet, which is low in calories, fat, and protein, but high in fiber, has been shown to be effective in reducing body weight, blood pressure, total cholesterol, and LDL levels (40). These effects were also accompanied by increased HDL levels and improved gut metabolism, reflecting the systemic benefits of a balanced local diet. Replacing saturated fat consumption with n-6 PUFA polyunsaturated fatty acids resulted in significant reductions in LDL, total cholesterol, and triglyceride levels, as well as improving the overall plasma metabolic profile (41). These findings emphasize the importance of developing dietary intervention strategies that are sensitive to the cultural context and dietary habits of local populations. Adapting dietary patterns based on regional characteristics may allow for a more sustainable, socially acceptable, and effective approach to reducing cardiovascular risk (42).

Previous studies have explored the effectiveness of lifestyle interventions such as diet, physical activity, and mental health support in the prevention of cardiovascular disease (CVD). However, these approaches are often examined in isolation and lack a comprehensive framework that combines all three components. Moreover, there is limited synthesis of literature evaluating how the integration of nutritional interventions, structured physical activity, and mental health management can produce synergistic benefits in reducing CVD risk, particularly among the productive age group. This study aims to address this gap by conducting a scoping review of current evidence on lifestyle-based interventions that incorporate these three elements. The scoping review approach was chosen because it enables a broad exploration of diverse study designs and intervention types, and it facilitates systematic mapping of the scope, variation, and gaps in the existing literature. The novelty of this study lies in its attempt to integrate findings from multidimensional interventions into a unified analytical framework, an approach that has been rarely undertaken in prior reviews. Therefore, this study not only provides a comprehensive mapping of the existing evidence but also serves as a foundation for developing more effective and evidence-based strategies for primary prevention. The specific objective of this review is to identify the types, characteristics, and impacts of interventions that combine dietary improvement, physical activity, and mental health management in the context of CVD prevention. This objective is consistent with the aims of

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a scoping review, which focuses on synthesizing and categorizing existing knowledge rather than testing specific hypotheses as typically found in empirical studies.

CONCLUSION

This scoping review highlights that a holistic and integrated approach that combines structured physical activity, a balanced diet, and mental health management is essential for the effective prevention and control of cardiovascular disease. These lifestyle interventions produce synergistic benefits that surpass those of single-faceted strategies, addressing not only metabolic and vascular health but also emotional well-being. Given the influence of individual genetic, social, and psychological factors, personalized interventions supported by digital and social tools are crucial for enhancing adherence and maximizing outcomes. Therefore, future studies should focus on developing and evaluating context-specific, personalized interventions that account for diverse population characteristics and health profiles. Research should also explore the role of digital health technologies, such as mobile applications, wearable devices, and telehealth platforms, in promoting engagement and long-term behavior change. Additionally, longitudinal and randomized controlled trials are needed to assess the sustainability, cost-effectiveness, and real-world applicability of these interventions. Interdisciplinary approaches that integrate behavioral science, implementation research, and community engagement will be vital to ensuring that these strategies are both effective and adaptable across varied healthcare settings.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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Appendix

Table 2. Data Extraction

No	Author and Year	Objective	Country	Design	JBI Score	Sample	Intervention/Description	Results/Findings
1	(Bergum et al., 2022)	To evaluate the efficacy of a multimodal primary prevention intervention programme for reducing cardiovascular risk, based on a hospital-based lifestyle course and primary care follow-up, in subjects with elevated cardiovascular risk1.	Norway	randomized controlled trial	84.6% (10/12)	701 adults (aged 35–67, elevated CVD risk) randomized; 601 completed 3-year follow-up	5-day hospital-based lifestyle course (nutrition, physical activity, smoking cessation, stress management, goal setting), followed by 3-year digital and primary care follow-up. Control group received usual care.	Significant reduction in cardiovascular risk scores (NORRISK, NORRISK 2, Framingham, PROCAM) after 36 months in intervention group vs. control. Proportion of daily smokers and metabolic syndrome decreased significantly in intervention group. No significant changes in cholesterol or blood pressure. Fewer cardiovascular events in intervention group1.
2	(Migueles et al., 2023)	To investigate the effects of a 20-week exercise program on cardiometabolic and mental health in children with overweight or obesity2.	Spain	randomized clinical trial	84.6% (10/12)	92 children (aged 8–11, overweight/ obesity) per-protocol analysis	3–5 sessions/week (90 min/session) of aerobic plus resistance training for 20 weeks. Control group continued usual routines.	Exercise program reduced cardiometabolic risk score (~0.38 SDs), decreased LDL cholesterol, BMI, fat mass index, and visceral adipose tissue, and improved cardiorespiratory fitness. No significant effects on mental health outcomes2.
3	(Han et al., 2022)	To examine the impact of the constructed Guangxi longevity dietary pattern on anthropometric measures, biochemical parameters, and fecal metabolites in volunteers at risk of cardiovascular disease	China	Quasy-Experimental	77.7% (7/9)	14 volunteers (7 male, 7 female; age 50–75)	2-week dietary intervention: Guangxi longevity diet (high fiber, low energy, low fat, low protein, low cholesterol; 1710 kcal/day, 32.9 g fiber/day)	Significant decrease in body weight, BMI, blood pressure, total cholesterol, LDL-c; significant increase in HDL-c. Fecal metabolomics: increase in butyrate and citrulline; decrease in threonine, choline, glycine, aspartate, alanine, N-acetylglutamic acid, lysine. Metabolic pathway analysis: significant changes in arginine biosynthesis, aminoacyl-tRNA biosynthesis, glycine/serine/threonine metabolism, alanine/aspartate/glutamate metabolism, valine/leucine/isoleucine biosynthesis.
4	(Pigsborg et al., 2022)	To identify metabolites differentiating diets where SFA is replaced with n-6 PUFA and to elucidate the association of diet-related metabolite patterns with cardiometabolic risk markers	Norway	Double-blind, randomized controlled trial	92.3% (11/12)	99 adults (58% female; age 25–70)	8-week intervention: Ex-diet (SFA replaced with n-6 PUFA; linoleic acid 12.9 g/day, SFA 5.7 g/day) vs. C-diet (SFA 19.2 g/day, linoleic acid 4.2 g/day)	PLS-DA differentiated metabolic profiles (AUC 0.83). Ex-diet: higher unsaturated plasmalogens, unsaturated acylcarnitine, secondary bile acid. C-diet: higher odd-numbered phospholipids, saturated acylcarnitine, lysoPC(14:0). Metabolic profile scores correlated with LDL-c, total cholesterol, and TG, but not with glycemia.
5	(Siu et al., 2015)	To test the efficacy of two Mediterranean diets (supplemented with extra-virgin olive oil or nuts) vs. a control diet (advice to reduce dietary fat) on primary cardiovascular prevention	Spain	Multicenter randomized controlled trial	84.6% (10/12)	7,447 participants (57% female; age 55–80)	Mediterranean diet + extra-virgin olive oil, Mediterranean diet + nuts, or control diet (advice to reduce fat). Follow-up median 4.8 years.	Major cardiovascular events: 3.8% (olive oil), 3.4% (nuts), 4.4% (control). Hazard ratio: 0.69 (olive oil), 0.72 (nuts) vs. control. Mediterranean diet reduced risk of major cardiovascular events in high-risk individuals.
7	(Siu et al., 2015)	Assessing the effect of 1 year of yoga on cardiovascular risk factors in middle-aged and older adults with MetS	Hong Kong	Randomized controlled trial	92.3% (11/12)	182	Yoga: 3x/week, 60 minutes/session (10 minutes warm-up, 40 minutes Hatha yoga, 10 minutes breathing relaxation), 1 year. Control: Monthly phone contact	Yoga significantly reduced waist circumference (p=0.003), and tended to lower systolic blood pressure
8	(Masa-Font et al., 2015)	To assess the impact of dietary patterns and lifestyle factors	India (Bhopal)	Quasy-Experiment	88.8% (8/9)	100 respondents	The study used a questionnaire survey to collect data on	Healthy dietary patterns (Mediterranean/DASH) and an active lifestyle were significantly associated

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No	Author and Year	Objective	Country	Design	JBI Score	Sample	Intervention/Description	Results/Findings
		on cardiovascular health outcomes, as well as to investigate the association between lifestyle factors and heart disease risk.				(65 males, 35 females)	dietary patterns, physical activity, smoking, alcohol, stress management, etc.	with reduced risk of heart disease. Respondents who adopted healthy behaviors tended to agree that a balanced diet, physical activity, and a healthy lifestyle are beneficial for heart health. Statistical analysis showed a significant association between dietary/lifestyle patterns and cardiovascular health outcomes.
9	(Masa-Font et al., 2015)	To evaluate the effectiveness of dietary education and physical activity (PA) intervention on changes in PA, BMI, and waist circumference (WC) in patients with severe mental disorders	Spain	Randomized Clinical Trial (RCT)	84.6% (10/12)	332 outpatients (aged 18–65 years, diagnosed with schizophrenia, schizoaffective disorder, or bipolar disorder, receiving antipsychotics ≥3 months, BMI ≥25, low physical activity)	Intervention group: diet education and physical activity program in groups (24 PA sessions, 16 diet education sessions, 3 months), guided by a mental health and primary care team. Control group: routine nurse care.	**PA:** Walking METs increased significantly in the intervention group (266.05 METs, 95%CI: 16.86–515.25; P=0.036). **Quality of life:** Physical function improved in the intervention group, while social and emotional function improved in the control group.
10	(Vitorino Monteiro et al., 2023)	To evaluate the benefits of meditation as a stress management strategy, in a traditional CV rehabilitation program, in terms of stress, anxiety, depression, and QoL for people with CAD.	Portugal	Randomized Controlled Trial	84.6% (10/12)	48 patients invited, 40 completed the study (65 ± 8 years, 80% male)	IG: 4 months of meditation (1 month: once per week, 90-minute group session; 3 months: 20 minutes/day alone/with video, weekly phone call). CG: usual care. After 4 months, CG was offered the meditation program.	IG reduced depression by 44% (p<0.001), anxiety by 30% (p=0.04), stress by 31% (p=0.05), emotional QoL dimension increased by 60% (p<0.001).
11	(Sirait et al., 2022)	Determining the effect of online-based Emotional Freedom Technique (EFT) therapy on blood pressure in hypertensive patients during the Covid-19 pandemic	Indonesia	Quasi-Experimental	88.8% (8/9)	50 responden (purposive sampling)	Online-based EFT therapy, using EFT SOP, sphygmomanometer, software/mobile phone, observation sheets.	There was a significant change in blood pressure after EFT intervention (p-value = 0.001). Before EFT: the majority (92%) were stage 1 (mild), after EFT: 66% were stage 1 (data seems erroneous, but statistically significant). Online EFT is effective
12	(Reed et al., 2022)	To compare the effects of 12 weeks of high-intensity interval training (HIIT), Nordic walking (NW), and moderate-to-vigorous intensity continuous training (MICT) on functional capacity, depression severity, brain-derived neurotrophic factor (BDNF), and quality of life (QoL) in patients with coronary artery disease (CAD) enrolled in cardiac rehabilitation.	Canada	Randomized controlled trial (single-center, parallel-group)	92.3% (11/12)	135	**HIIT:** 4 × 4-min high-intensity intervals at 85–95% peak heart rate (HR), twice weekly for 12 weeks. **NW:** Walking with Nordic poles at resting HR + 20–40 bpm, twice weekly for 12 weeks. **MICT:** Moderate-to-vigorous continuous exercise at resting HR + 20–40 bpm, twice weekly for 12 weeks. All interventions included supervised group-based sessions.	**Functional capacity (6MWT):** NW group had significantly greater increase in distance (77.2±60.9 m) vs. HIIT (51.4±47.8 m) and MICT (48.3±47.3 m), p=0.042. **Depression (BDI-II):** Significant improvement in all groups (HIIT: -1.4±3.7, NW: -1.6±4.0, MICT: -2.3±6.0 points; main effect of time p<0.001). **BDNF:** No significant change in any group (p>0.05). **QoL (SF-36 & HeartQoL):** Significant improvements in all groups (main effect of time p<0.05). **Attendance:** All groups attended most sessions (HIIT: 17.7±7.5, NW: 18.3±8.0, MICT: 16.1±7.3 out of 24, p=0.387). **Safety:** All interventions were safe, with few adverse events. NW was superior in increasing functional capacity, a predictor of future cardiovascular events

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