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Executive Summary

Chronic health conditions (CHCs), including cardiovascular disease (CVD) and type 2 diabetes (T2D), represent a significant global health challenge. Physical activity is widely recognised as a cornerstone of both prevention and ongoing management for these conditions, with well-established benefits for physical, mental and metabolic health. Although physical activity is a key management strategy, rates of inactivity remain high among people with CVD and among those with T2D. This literature review examines how physical activity and sport can contribute to improved health, well-being and quality of life for people living with these conditions and explores approaches to support greater participation.

Key Findings

Physical activity as prevention:

- Physical inactivity increases the risk of developing CVD and T2D. Conversely, even modest increases in physical activity significantly reduce the incidence of these CHCs.
- Observational and intervention studies support multicomponent lifestyle interventions, including physical activity, as effective in preventing both conditions.
- Sports participation, especially when played at higher intensities, is associated with reduced risk of CVD/T2D.

Physical activity as a management strategy:

- Physical activity improves glycaemic management (T2D), blood pressure, cholesterol and cardiovascular fitness in people living with T2D and people living with CVD.
- Resistance training and high-intensity interval training appear to have additional benefits for those who are able to participate (though individualised, safe programming is essential).
- Participation in team sports, as a particular mode of physical activity, has demonstrated noteworthy benefits for those with T2D and those with hypertension.

Barriers and facilitators:

- Common barriers to physical activity include physical limitations, fear of injury or adverse events, low motivation, low self-efficacy, embarrassment, diabetes distress, depression and lack of support.

- Facilitators include greater social support, self-efficacy, enjoyment, healthcare professional support and behavioural strategies like goal setting and self-monitoring.

- Tailored interventions, grounded in behaviour change theory and that incorporate sport and physical activity within supportive environments are most effective.

Policy and Practice:

- European counties, including Belgium, Italy, Romania and Kosovo, are promoting physical activity through policy initiatives.

- Despite policy efforts, inactivity remains high, suggesting a need to emphasise the social, economic and health value of physical activity, particularly through sport.

- The use of social prescribing of sport and physical activity by health professionals appears to be gaining momentum in Europe but is not yet consistently adopted.

Conclusion:

The proven effectiveness of physical activity and sport in preventing and managing CHCs, combined with their broader social and economic benefits, support greater integration into healthcare and community systems. Despite robust evidence and growing policy support, rates of inactivity remain high among people living with CVD and T2D. The implementation of tailored, inclusive and theory-driven interventions to address unique and complex barriers to physical activity for those living with CHCs are crucial to improving physical activity participation in this population. When tailored to individual abilities, sports may provide an effective means of overcoming the psychosocial barriers to physical activity often experienced by this population, though more research is required.

Introduction

Chronic health conditions (CHCs), also referred to as non-communicable diseases (NCDs), continue to present significant challenges for individuals, communities and health systems around the world. CHCs are a group of conditions which are generally long-standing in nature and are caused by a combination of genetic, physiological, environmental and behavioural factors (World Health Organization, 2024b). The main conditions included in this group are diabetes, cardiovascular disease (CVD), cancer and chronic respiratory conditions (World Health Organization, 2024b). In 2021, more than 43 million people died globally from NCDs (United Nations Secretary General, 2025). In Europe, 87% of deaths among people aged between 30-70 years were attributed to NCDs in 2019 (World Health Organization - Regional Office for Europe, 2024). More specifically diabetes (in people aged 20-79 years) and CVD accounted for 9% and 32% of all deaths in Europe in 2024 and 2021, respectively and contribute to a growing economic burden (Eurostat, 2024; International Diabetes Federation, 2025a; Timmis et al., 2024).

CVD refers to a group of conditions affecting the heart and blood vessels, which are responsible for transporting blood throughout the body. These conditions include coronary artery disease, stroke, heart failure, peripheral artery disease and other conditions involving the circulatory system (Timmis et al., 2024). More than half a billion people around the world are affected by CVD (World Heart Federation, 2023). High blood pressure or hypertension is the leading cause of CVD and in 2019 affected 36% of females and 41% of males in Europe (Timmis et al., 2024).

Although diabetes can take many forms, all of which have a significant impact on the person living with the condition, for the purposes of this document, type 2 diabetes (T2D) will be the focus. There are currently 33.7 million adults living with diabetes in Europe, with T2D accounting for 90% of all cases (International Diabetes Federation, 2025b). T2D is a metabolic condition resulting in insulin resistance and or relative insulin deficiency resulting in hyperglycaemia or raised blood glucose levels (World Health Organization, 2019).

Although CVD and T2D are complex, they are interconnected and share a number of common lifestyle-related risk factors including obesity, physical inactivity and tobacco use (World Health Organization, 2021a, 2024a). The management of both CVD and T2D is multifaceted and includes medication, dietary management, physical activity, weight management and self-management education. Among these strategies, physical activity plays a particularly important role and will be the focus of this paper.

Though often used interchangeably, the terms physical activity, exercise and sport are not synonymous. Physical activity is defined as “any bodily movement produced by skeletal muscles that results in energy expenditure” (Caspersen et al., 1985, p. 126). It can include daily activities such as household chores, work-related activity, leisure time activity, transport-related activity and incidental activity. Exercise is a subcategory of physical activity and is activity that is structured and repetitive, with the goal to improve or maintain fitness (Caspersen et al., 1985). Sport is a subset of exercise, it is undertaken

individually or as part of a team and "participants adhere to a common set of rules or explanations and a defined goal exists" (Khan et al., 2012, p. 59).

Regular physical activity participation has been shown to reduce the risk of coronary heart disease, stroke, T2D, hypertension, colon and breast cancer, depression, and can assist weight management (I. M. Lee et al., 2012; World Health Organization, 2018). Physical activity recommendations for people living with CVD and T2D encourage 150-300 minutes of moderate-intensity or 75-150 minutes of vigorous-intensity aerobic activity per week. In addition to aerobic activity, it is recommended that those living with CVD and T2D include moderate-intensity muscle-strengthening activities on 2-3 non-consecutive days per week, and incorporate flexibility and balance activities at least two days per week (Colberg et al., 2016; Kanaley et al., 2022; Pelliccia et al., 2020; World Health Organization, 2021b). Additional medical clearance and advice may be required before commencing vigorous-intensity activity for those who are at high risk of cardiac event or who experience new, unstable or symptomatic conditions (Colberg et al., 2016; Pelliccia et al., 2020). Limiting and breaking up sedentary or sitting time is also recommended and the notion that 'any physical activity is better than none' is widely recognised (Colberg et al., 2016; Kanaley et al., 2022; Pelliccia et al., 2020; World Health Organization, 2021b).

Physical inactivity is recognised as a global public health problem and its impact on the global burden of disease continues to rise (Brauer et al., 2024; Ekelund et al., 2020; Ekelund et al., 2019; Kohl et al., 2012; Stamatakis et al., 2019). People who are insufficiently active have a 20-30% increased risk of premature death compared to those who are sufficiently active (World Health Organisation, 2020). One study which aimed to quantify the effect of physical inactivity on NCDs estimated that if inactivity were eliminated, 7% and 6% of the burden of disease worldwide due to T2D and coronary heart disease, respectively would be averted (I. M. Lee et al., 2012). The same authors suggest physical inactivity, as a risk factor for poor health, has an effect similar to that of smoking and obesity (I. M. Lee et al., 2012).

Despite the well documented benefits of physical activity, rates of insufficient activity have increased from 32% to 37% in high-income countries between 2001 and 2016 (World Health Organisation, 2020). In Europe, one in three adults do not meet physical activity recommendations (OECD/WHO, 2023). In an attempt to address the rise in physical inactivity, the World Health Organization (WHO) launched a Global Action Plan on Physical Activity 2018-2030, which aims to reduce physical inactivity by 15% by 2030 (World Health Organization, 2018). The Action Plan reiterates that the vast benefits of physical activity can and should be available to all, including those living with CHCs.

Even higher rates of inactivity have been observed when comparing activity levels between the general population and those living with CVD and or T2D. A Danish study found 63% o f study participants with diabetes were not meeting WHO physical activity guidelines compared to 50% of study participants without diabetes (Mortensen et al.,

2023). A systematic review by Kennerly and Kirk (2018) concludes that irrespective of study methods and study location, people living with T2D are less active and more sedentary than those who do not live with T2D. In relation to those living with CVD, a large cohort study using UK Biobank data revealed 34% of those living with CVD reported low activity levels, compared to 20% of those without the condition, while 34% reported spending greater than three hours watching television, compared to 20% of those without the condition (Cassidy et al., 2016). The same study found that those living with both CVD and T2D were 70% more likely to report low physical activity levels than those without these conditions (Cassidy et al., 2016). Further supporting these findings in the CVD population, Vasankari et al. (2018) found those living with or at high risk of CVD were more sedentary and less active than their peers with low CVD risk.

Aims and review questions

The high rates of inactivity among those living with CVD and or T2D suggests there may be additional considerations and greater complexity in navigating physical activity for this population. To explore this further, we sought to provide a comprehensive overview of the literature to understand how and why physical activity should play an active role in the day to day lives of those living with CVD and T2D.

This review aims to explore and synthesise research to answer the following questions:

1. What is the role of physical activity and sport in the prevention and management of CVD and or T2D?

2. What are the salient barriers to, and facilitators of, physical activity for adults living with CVD and or T2D?

3. What are the economic, social and environmental impacts of physical activity and sport on people living with CHCs?

4. What policies and practices are in place in Belgium, Italy, Kosovo and Romania to support physical activity and sport for people living with CHCs?

Search strategy

A thorough search of the literature was conducted using adapted search strategies for each database: Web of Science, PubMed, Scopus and Cochrane Library. The reference lists of included studies were also searched for relevant articles. Grey literature was searched using Google and Google Scholar search engines. Searches were limited to English, human studies, published within the last 15 years and given the well-established nature of the topic areas, systematic reviews were prioritised.

Physical Activity in the Prevention of CVD and T2D

There is well established evidence (across a variety of methodologies) to support physical activity as a primary prevention strategy for many CHCs, including T2D and CVD. The Organisation for Economic Co-operation and Development (OECD) used a Strategic Public Health Planning for Non-Communicable Diseases (SPHeP-NCDs) model to calculate the burden of insufficient physical activity on NCDs in 27 European Union Member States (OECD/WHO, 2023). This model estimated that if everyone were to meet minimum physical activity recommendations (150 minutes per week of moderate-intensity physical activity), 4% of all new T2D and 2% of CVD cases would be avoided. If people were to participate in 300 minutes of moderate-intensity physical activity per week, the model found that 10% and 5% of new T2D and CVD cases would be prevented (OECD/WHO, 2023).

Many observational studies have examined the relationship between physical activity and the incidence of CVD and T2D which has facilitated many high-quality systematic reviews and meta-analyses in this area. Studies reveal inactivity and sedentary behaviour significantly increase the risk of diabetes, CVD, and hypertension (Aune et al., 2015; J. Li & Siegrist, 2012; K. Liu et al., 2012; Marques et al., 2018; Vasankari et al., 2018; Wilmot et al., 2012). Muscle strengthening activity has also been shown to reduce the incidence of T2D and CVD by 17% (Momma et al., 2022). Physical activity has now also been found to have a strong, inverse dose-response relationship with CVD and hypertension (Alves, Viana, Ribeiro, et al., 2016; Huai et al., 2013; X. Liu et al., 2017; Sattelmair et al., 2011; Schuler et al., 2013), as well as with T2D (Boonpor et al., 2023; Smith et al., 2016). An inverse dose response relationship suggests as physical activity levels increase, the risk of developing these conditions decreases. These studies highlight the importance of physical activity in the prevention of CVD and T2D, suggesting some physical activity is better than none and that higher rates of physical activity may incur greater preventative health benefits.

The relationship between physical activity and the incidence of CVD and T2D is clear. To further understand the cause-and-effect relationship between these variables, we turn to systematic reviews and meta-analyses of interventional studies. Although few studies have isolated the effects of physical activity on CVD and T2D risk, there is strong evidence that multicomponent lifestyle interventions (targeting multiple lifestyle risk factors, including diet, weight management and physical activity) are effective in preventing both conditions. In T2D prevention, lifestyle interventions consisting of dietary changes, physical activity and personalised counselling in ‘at-risk’ populations are shown to significantly reduce T2D incidence (Andrade et al., 2025; Hemmingsen et al., 2017; Schellenberg et al., 2013). These findings support the findings of an earlier review by Uusitupa et al. (2019), who also emphasised that T2D risk reduction is strongly related to the degree of long-term weight loss and ability to sustain lifestyle changes. Nonetheless, these preventative effects have been shown to last for many years after the lifestyle interventions (Uusitupa et al., 2019).

The evidence for multicomponent lifestyle interventions in the primary prevention of CVD is less clear (Uthman et al., 2015). However, one systematic review found that when assessing the effect of lifestyle interventions on CVD risk markers, most of the interventions included improved at least some of these risk factors and that most improvement was observed as physical activity increased (Abbate et al., 2020). As seen in T2D risk reduction, sustainability of lifestyle changes was also highlighted by Abbate et al. (2020) as a fundamental marker for CVD risk reduction. Although these studies show lifestyle interventions to be effective and feasible, their long-term clinical benefit is limited (Cardona-Morrell et al., 2010). Limitations in sustainability of lifestyle change, including physical activity, hinges on effective translation into practice (Cardona-Morrell et al., 2010).

Sports for prevention

There is growing support for using sport as a preventative and management strategy in health (Khan et al., 2012; Krustrup & Krustrup, 2018). However, systematic reviews examining the association between sports participation and health have provided mixed results owing to the fragmented nature and quality of included studies (Oja et al., 2015). A large prospective cohort study, the Dutch Monitoring Project on Risk Factors for Chronic Disease Study found that cycling and sports participation were both inversely associated with CVD incidence, while there was a dose-response relationship with sports participation and CVD incidence (Hoevenaar-Blom et al., 2011). The authors attribute these associations to the moderate-vigorous intensity of both cycling and sports, which has been shown to have greater positive effects on a number of factors such as blood pressure, lipid profiles, blood vessel function, systemic inflammation and blood clotting properties (Hoevenaar-Blom et al., 2011). In accordance with these findings, researchers in the UK found associations between participation in swimming, racquet sports and aerobics and a reduction in CVD mortality using data from the Health Survey for England and the Scottish Health Survey (Oja et al., 2017). A second, more recent cohort study from the Netherlands, the LifeLines cohort study and biobank, found that sports participation was associated with significant reduced risk of T2D in overweight categories and pre-diabetes in healthy weight and overweight categories (de Boer et al., 2021). Although de Boer et al. (2021) and Hoevenaar-Blom et al. (2011) did not find significant associations between walking and CVD/T2D risk, there is an existing body of evidence that suggests regular walking may be associated with lower risk of T2D and cardiovascular events (Aune et al., 2015; Jayedi et al., 2024; Kelly et al., 2014).

Khan et al. (2012) highlight the well-established evidence relating to the health benefits of physical activity and that the health benefits of sports are proportionate to the amount of activity involved in the particular sport. This notion is also supported by (Bennike et al., 2024) in a white paper describing football as prevention and treatment of T2D and CVD due to the vigorous nature of exercise intensity. Systematic reviews and meta-analyses investigating the effects of football on health have shown positive effects on cardiorespiratory fitness (VO2max), blood pressure, resting heart rate, fat mass, cholesterol and muscular fitness (Milanović et al., 2015; Milanović et al., 2019).

Physical Activity in the Management of CVD and T2D

There is extensive evidence of the role physical activity plays in the management of both CVD and T2D, with many international guidelines and consensus statements promoting its inclusion. The WHO, European Association for the Study of Diabetes (EASD), American Diabetes Association (ADA), American College of Sports Medicine, Exercise and Sports Science Australia and Diabetes Canada have all published comprehensive guidelines or consensus statements detailing the use of physical activity in the management of T2D (Colberg et al., 2016; M. J. Davies et al., 2022; Diabetes Canada Clinical Practice Guidelines Expert Committee, 2018; Hordern et al., 2012; Kanaley et al., 2022; World Health Organization, 2021b), while the European Society of Cardiology, European Heart Network and Exercise and Sports Science Australia have all published guidance supporting the role of physical activity in management recommendations for people living with CVD (European Heart Network, 2019; Pelliccia et al., 2020; Piepoli et al., 2016; Schultz et al., 2025). Global public health guidelines on physical activity and sedentary behaviour for those living with CHC, including T2D, CVD and hypertension have also been established (Dempsey et al., 2021).

Physical activity in the management of T2D

There is consensus that physical activity has positive effects on a number of key diabetes outcomes which can contribute to significantly reducing the risk of diabetes-related complications. Although various types of physical activity have shown health and glycaemic benefits, structured exercise training has been studied most frequently (Kanaley et al., 2022). Regular aerobic training improves glycaemic management in adults living with T2D, improves insulin sensitivity, lipids, blood pressure, fitness (a key determinant of premature death) and how the cells produce energy (mitochondrial function), even without weight loss (M. J. Davies et al., 2022; Hou et al., 2023; Kanaley et al., 2022; Kemps et al., 2020).

Resistance training or muscle strengthening activities have been shown to improve muscle strength, bone density, blood pressure, lipid profiles, skeletal muscle mass and insulin sensitivity (M. J. Davies et al., 2022; Kanaley et al., 2022; Pan et al., 2018). Increasing muscle mass can increase glucose uptake and has resulted in HbA1c reduction in older adults (M. J. Davies et al., 2022; Kanaley et al., 2022). Resistance training at higher intensities appears to produce greater glycaemic and insulin benefits for those who can safely manage this intensity (Kanaley et al., 2022). There is growing evidence to suggest that combining aerobic and resistance activities has greater impact on HbA1c reduction than either mode alone (Kanaley et al., 2022; Mannucci et al., 2021; Pedersen & Saltin, 2015).

High intensity interval exercise (HIIE) is now generally considered more effective than low-intensity training for those who can safely participate. High intensity, short intervals of exercise, interspersed with recovery periods has shown greater effects in reducing hyperglycaemia after meals, HbA1c, insulin sensitivity, beta cell function, fitness levels, body mass index, body composition, CVD risk and cardiac function (Kanaley et al., 2022;

Pedersen & Saltin, 2015). Despite its superior benefits and time-efficiencies, HIIE may not be suitable or preferred by all those living with T2D.

Physical activity in the management of CVD

Hypertension is a key modifiable risk factor for CVD and is strongly related to cardiovascular mortality (Pedersen & Saltin, 2015; Rijal et al., 2024). The effect of physical activity on blood pressure has been studied extensively. Multiple meta-analyses have found a reduction in blood pressure with aerobic activity, resistance training and combination exercise (Cornelissen & Smart, 2013; Dassanayake et al., 2022; Lopes et al., 2018; Pescatello et al., 2019; Rijal et al., 2024; Semlitsch et al., 2013). Pescatello et al. (2019) summarised the findings of 15 meta-analyses and showed that systolic blood pressure fell between 5-17 mm Hg and diastolic blood pressure reduced by 2-10 mm Hg in response to physical activity across included trials. Lopes et al. (2018) highlight the emergence of isometric exercise as an effective mode of activity to reduce systolic, diastolic and mean blood pressure, though more research is needed to confirm the potential benefits of isometric exercise in reducing blood pressure in those with hypertension (Inder et al., 2016; Jin et al., 2017).

A recently updated Cochrane review synthesised the evidence for exercise-based cardiac rehabilitation for coronary heart disease (Anderson et al., 2016; Dibben et al., 2021). The review concludes that exercise-based cardiac rehabilitation reduces the risk of myocardial infarction (hear attack), all-cause mortality and results in a large reduction in all-cause hospitalisation and health-related quality of life (Anderson et al., 2016; Dibben et al., 2021). These findings are also reflected and supported by Rao et al. (2022) and Salzwedel et al. (2020). More generally for those with CVD, including coronary artery disease, it is agreed that physical activity improves cardiorespiratory fitness (including VO2max and heart rate reserve), blood vessel function, cholesterol levels, blood pressure and quality of life, while reducing resting heart rate, the risk of reduced blood flow to the heart and decreases inflammation, blood vessel stiffness and the likelihood of blood clots forming. (Alves, Viana, Cavalcante, et al., 2016; Kunutsor & Laukkanen, 2024; Vasankari et al., 2021).

A review by Vasankari et al. (2021) revealed the greatest benefits were demonstrated with aerobic interval training or high intensity interval training. An earlier review and meta-analysis echoes these conclusions, finding that aerobic interval training generated greater improvements in cardiorespiratory fitness, blood vessel function and heart function and efficiency (left ventricular function and morphology) when compared to moderate-intensity continuous training (Cornish et al., 2011; Hussain et al., 2016). Further research into the long-term effects and safety of interval training in those with CVD is needed, particularly outside of a supervised environment owing to the increased risk of cardiovascular events in this population (Cornish et al., 2011; Hussain et al., 2016; Quindry et al., 2019).

Resistance training, at moderate intensity has been proven safe and effective in improving exercise capacity, mobility, muscle strength, quality of life and heart function

and efficiency in those living with coronary artery disease (Bjarnason-Wehrens et al., 2022; Elliott et al., 2015; Fan et al., 2021). A meta-analysis examining the effects of circuit resistance training in those with coronary heart disease found a significant decrease in body mass index and body fat percentage but not in cardiorespiratory fitness, systolic blood pressure, total blood cholesterol and triglycerides (Wu et al., 2022). Much like the effects seen in T2D, a combination of aerobic exercise and resistance training has been shown to be most effective in improving cardiorespiratory fitness, quality of life, skeletal muscle strength and size, endurance (aerobic capacity) and heart function and efficiency (Fan et al., 2021; J. Lee et al., 2020; Marzolini et al., 2012).

Sports in the management of T2D and CVD

As discussed earlier, using sports as a specific mode of physical activity in the general population has been proven effective in reducing key risk factors associated with CHC (Hoevenaar-Blom et al., 2011; Khan et al., 2012; Milanović et al., 2015; Milanović et al., 2019; Oja et al., 2017; Oja et al., 2015). Research exploring the use of sports as a treatment or management strategy for CHC is less developed (Milanović et al., 2019). One of the few systematic reviews and meta-analyses in this area reviews the overall physical fitness benefits of recreational football in relation to health status (Milanović et al., 2019). A reduction in systolic and diastolic blood pressure (11 and 7 mmHg respectively) was observed after 3–4-month recreational football interventions in those with hypertension. Broadly speaking, the authors conclude recreational football can be used as an effective non-pharmacological treatment of conditions including hypertension and metabolic syndrome (Milanović et al., 2019).

A small number of interventional studies using sports interventions in people with T2D or hypertension have reported positive health benefits. Recreational football was found to increase cardiorespiratory fitness, lower total body fat mass, improve glucose management and decrease insulin resistance, all key components of lowering the risk of diabetes-related complications (Andersen et al., 2014; de Sousa et al., 2017). Morgan et al. (2017) combined diabetes education and physical activity promotion within a UK football club and although they observed significant reductions in waist circumference, body mass index, cholesterol and blood glucose levels, there were no significant improvements in activity levels.

In those living with hypertension, recreational football has been found to reduce blood pressure, improve cardiorespiratory fitness, reduce resting heart rate and CVD risk (Krustrup et al., 2013; Mohr et al., 2014). In a study of habitually active men with mild hypertension, recreational football was shown to provide cardiovascular and metabolic health benefits including improved blood pressure, body composition and heart function and efficiency (Knoepfli-Lenzin et al., 2010). In contrast, a three-month recreational futsal intervention did not result in blood pressure reduction in men with treated hypertension, but did show benefits to cardiorespiratory fitness, resting heart rate, glucose levels (HbA1c and plasma glucose), bone density and balance (Teixeira et al., 2023).

Economic, Social and Environmental Benefits of Sport and Physical Activity

Beyond and as an extension of health benefits, much more is gained by increasing participation in sport and physical activity. Broadly speaking, some estimate that if the Global Action Plan on Physical Activity is successful in producing a 15% reduction in global inactivity by 2030, US$25-36 billion could be added to the global gross domestic product (GDP) annually (Hafner et al., 2020; World Health Organization, 2018). Of the WHO regions, the European region bears the highest proportion of economic cost attributed to physical inactivity (32%) (Santos et al., 2023). Inactivity costs the EU €80.4 billion per year through the four major NCDs, which include CVD and T2D (International Sport and Culture Association / Cebr, 2015). Valero-Elizondo et al. (2016) examined the economic impact of physical activity among those living with CVD. The authors estimated that physical activity results in a 20% reduction in healthcare expenditure among those living with CVD and when compared to those living with high CVD risk, a 50% reduction in expenditure is projected (Valero-Elizondo et al., 2016).

Social return on investment (SROI) frameworks are gaining popularity as a way of understanding and measuring economic, social and environmental value created by an activity, organisation or intervention (Nicholls et al., 2012). Examples of SROI in sport include analyses conducted in Wales, Belgium, England and The Netherlands (L. E. Davies, 2022; Rebel Mulier Institute, 2019; Sport England, 2020; Sport Industry Research Centre, 2018). In Wales, the analysis found that for every £1 invested in sport, there is a return of £2.88 (Sport Industry Research Centre, 2018). The social value of sport was estimated to be £651 million in social capital, £91 million in enhanced education, £2 million in reduced crime and £295 million in improved health (Sport Industry Research Centre, 2018). The Wallonia-Brussels study found that for every €1 invested in sport, €1.21 worth of social impact was generated for society, with sport generating €2 billion of social value from €1.69 billion of inputs (L. E. Davies, 2022). It was estimated that €759 million of social value was generated from health, €505 million from volunteer productivity, €430 million from subjective wellbeing outcomes and €342 million from social capital (L. E. Davies, 2022). A report by Sport England found that for every £1 spent on sport and physical activity, there was a return of £3.28 (Sport England, 2020). Finally, in The Netherlands, €1 of investment in sport generated an estimated €2.51 in social value (Rebel Mulier Institute, 2019).

Sports participation has consistently been shown to increase subjective well-being (life satisfaction and happiness) (Becchetti et al., 2012; Campillo-Sánchez et al., 2025; Dolan et al., 2014; Downward & Rasciute, 2011; Eigenschenk et al., 2019; Huang & Humphreys, 2012; Rasciute & Downward, 2010; Taylor et al., 2015). Many aspects of social capital (the value derived from positive connections between people) have also been shown to increase with sports participation (Ottesen et al., 2010). These include increased social connectedness, social interactions, social inclusion, internal bonding and social relationship skills (Campillo-Sánchez et al., 2025; Downward & Rasciute, 2011;

Eigenschenk et al., 2019; Eime et al., 2013; Krustrup & Krustrup, 2018; Taylor et al., 2015). Bennike et al. (2024) and Eime et al. (2013) highlight several studies which demonstrate the potential of team or club sports to build social bonds and committed communities, greatly influencing long-term participation and sustainability. A clear relationship exists between subjective well-being, general health and social capital, with further evidence to suggest that if engagement in sport raises general health and subjective well-being, then further sport participation becomes more likely, precipitating further health benefits (Downward et al., 2017).

Barriers to Physical Activity

For many people living with CHC, participating in physical activity can be difficult (Janevic et al., 2012; Kwan et al., 2012; Valero-Elizondo et al., 2016). People living with CHC often experience complex and unique barriers to physical activity, in addition to barriers experienced by the general population, which may contribute to the previously mentioned high rates of inactivity in those living with CVD and or T2D (Bullard et al., 2019).

Barriers - T2D

Barriers to physical activity among people living with T2D are multifaceted, can be specific to region and culture and include both general and diabetes-specific themes. Barriers have been found across areas which include physiological, psychological, environmental and social/cultural (Thielen et al., 2023; Vilafranca Cartagena et al., 2021). Thielen et al. (2023) report limitations due to physical symptoms is among one of the most reported barriers to physical activity in people living with T2D. These limitations can relate to lack of cardiorespiratory fitness, greater perceived exertion, fatigue, physical discomfort or pain (Bytyci Katanolli et al., 2022; Duclos et al., 2015; Thielen et al., 2023; Vilafranca Cartagena et al., 2021). Thielen et al. (2023) postulate that the sum of cardiac, skeletal muscle, circulatory and metabolic abnormalities may contribute to reduced exercise performance in this population.

There is a strong bidirectional relationship between depression and diabetes, as well as a high prevalence of diabetes distress (36%) among people living with T2D (Perrin et al., 2017; Semenkovich et al., 2015). Diabetes distress differs from depression: it refers to psychological distress specific to living with diabetes, precipitated by the demands of self-management, fears, guilt and shame relating to the condition and diabetes-related complications (Perrin et al., 2017). Those with T2D who are also experiencing depressive symptoms or diabetes distress, understandably, have greater difficulties engaging in physical activity and other self-management tasks (Perrin et al., 2017; Thielen et al., 2023; Vilafranca Cartagena et al., 2021). Commonly reported barriers to physical activity such as low motivation, embarrassment and low self-efficacy are both exacerbated and experienced differently by those living with diabetes, particularly on the background of depression or diabetes distress (Thielen et al., 2023). Given the additional planning, consideration and self-management required for physical activity, as well as the stigma

experienced by people living with diabetes, it is clear why and how low motivation, low self-efficacy and embarrassment present as prominent barriers to activity in this population (Bytyci Katanolli et al., 2022; Duclos et al., 2015; Thielen et al., 2023).

Lack of support (from family, friends and health professionals) presents as a pertinent barrier to physical activity among people living with T2D and can be influenced by cultural norms, appears to present most commonly among women and may be more pronounced the longer someone lives with the condition (Bytyci Katanolli et al., 2022; Duclos et al., 2015; Thielen et al., 2023; Vilafranca Cartagena et al., 2021). People describe a lack of social support, lack of medical information and support relating to physical activity, a lack of family support and perceived family pressures (Thielen et al., 2023; Vilafranca Cartagena et al., 2021). The prevalence of depression and diabetes distress in the T2D population also perpetuates the need for support and highlights the potential impact of lack of support on people wishing to become more active.

Finally, environmental factors are highlighted as a barrier to activity for this population (Bytyci Katanolli et al., 2022; Thielen et al., 2023; Vilafranca Cartagena et al., 2021). More specifically, a lack of safe and appropriate facilities or outdoor environments, as well as limited opportunities have been reported as reasons for not pursuing physical activity among those living with T2D (Thielen et al., 2023; Vilafranca Cartagena et al., 2021). These barriers may be more pronounced for those experiencing diabetes-related complications or comorbid conditions, however more research is needed to explore this notion.

Barriers - CVD

Barriers to physical activity among those living with CVD and/or hypertension mirror many of those found among people living with T2D. The most commonly reported barriers to physical activity for people living with CVD/hypertension are pain or discomfort due to other comorbid conditions, low fitness levels, fatigue, lack of support and information surrounding safe activity, low motivation and lack of access to safe environment or facilities (Collado-Mateo et al., 2021; Q. Li et al., 2024; Lopes et al., 2021; McCarthy et al., 2011; Rashidi et al., 2020). The implications and relevance of these barriers are similar to those discussed above in T2D. A prominent barrier and one that is unique to those living with CVD/hypertension is the fear of adverse effects or cardiac events as a result of engaging in physical activity (Collado-Mateo et al., 2021; Jia et al., 2024; McCarthy et al., 2011; Rashidi et al., 2020). Some studies indicate that over 70% of people living with CVD experience ‘exercise phobia’ (Dąbek et al., 2020; Knapik et al., 2019). Poor or lacking referral processes have also been identified as a barrier to physical activity, particularly to cardiac rehabilitation programmes and is more commonly experienced by women with CVD (Boden et al., 2014; McCarthy et al., 2011; Witvrouwen et al., 2021).

Facilitators of Physical Activity

Given the complex and unique barriers to physical activity experienced by those living with T2D and CVD, interventions and programmes designed to increase physical activity in this population need careful consideration. One of the most commonly cited facilitators and determinants of physical activity in people living with CHCs are psycho-social elements, including social support, motivation, self-efficacy and a fun and enjoyable environment (Booth et al., 2013; Collado-Mateo et al., 2021; Duclos et al., 2015; Q. Li et al., 2024; Lopes et al., 2021; Vilafranca Cartagena et al., 2021; Williamson et al., 2021; Zhao et al., 2024). These elements are well supported by theoretical behaviour change models commonly used to promote physical activity behaviour change in these populations (Quested, 2021; Williamson et al., 2021; Zhao et al., 2024). Social Cognitive Theory and Self-determination Theory draw on elements of social learning and the social environment to drive autonomous motivation and self-efficacy in physical activity (Williamson et al., 2021; Young et al., 2014; Zhao et al., 2024). It is recommended programmes designed to address physical inactivity in people with CHCs consider the importance of the social environment and be grounded in appropriate theory that facilitate self-determination and self-efficacy (Williamson et al., 2021; Young et al., 2014; Zhao et al., 2024).

According to self-determination theory, motivation for physical activity participation can be influenced by a number of basic individual needs, including competence, autonomy and relatedness (Ryan & Deci, 2017). The theory also identifies how the social environment can be optimized to encourage motivation for behaviour change (Quested, 2021; Ryan & Deci, 2017). Quested (2021) show that autonomous motivation regulators which support personal goals, value health benefits, friendships, fun/excitement and satisfaction/accomplishment are more likely to facilitate motivation for positive behaviour change, including in physical activity. Sport creates a unique environment which innately fosters these elements of motivation (Campillo-Sánchez et al., 2025; Downward & Rasciute, 2011; Eigenschenk et al., 2019; Krustrup & Krustrup, 2018; Taylor et al., 2015). Leveraging the social connectedness, social interactions, social inclusion and fun offered by sports appears to be a practical and effective way to drive physical activity participation, particularly in those who might be isolated or excluded due to CHCs (Bennike et al., 2024; Khan et al., 2012; Krustrup & Krustrup, 2018).

An extension of social environment and support is the support generated by health professionals, which has also been identified as an important factor in facilitating activity in people living with CHCs (Booth et al., 2013; Collado-Mateo et al., 2021; Duclos et al., 2015; Lopes et al., 2021; Rashidi et al., 2020; Santiago de Araújo Pio et al., 2019; Williamson et al., 2021; Zhao et al., 2024). People with CHCs are more likely to engage with physical activity programmes that involve person-centred support from a healthcare professional. Some suggest the presence or involvement of a healthcare professional (or multidisciplinary team) can be reassuring for people experiencing low confidence in participating in physical activity, maintain engagement and be an avenue for people to seek advice and gain knowledge (Collado-Mateo et al., 2021; Duclos et al.,

2015; Q. Li et al., 2024; Lopes et al., 2021; Rashidi et al., 2020; Thielen et al., 2023; Williamson et al., 2021). However, *how* the health professional engages with the person living with CHCs is crucial to the success of the interaction (Quested, 2021; Williamson et al., 2021; Zhao et al., 2024). Williamson et al. (2021) promote training of healthcare professionals in theoretically and empirically informed approaches to behavioural counselling to support physical activity uptake for CVD management. The authors also highlight the complex process of health behaviour change and that difficulties achieving physical activity recommendations are normal and should be met with understanding and empathy (Williamson et al., 2021). The WHO Regional Office for Europe (2024), has developed guidance on becoming a 'Health Promoting Sports Coach' for sports coaches interested in adopting a person-centred, health promotion philosophy to promote health and well-being among sports participants and stakeholders. Quested (2021) encourage teaching motivational regulation to those poised to provide physical activity support as a way to encourage a social environment conducive to autonomous motivation (as mentioned above).

Programmes incorporating elements of self-regulation, such as self-monitoring/bio-feedback, action planning, goal setting, problem solving and record keeping have been shown to be successful in promoting physical activity in those with CHCs (Bullard et al., 2019; Collado-Mateo et al., 2021; Konerding & Szel, 2021; Lopes et al., 2021; Thielen et al., 2023). Technology can plan a key role in self-regulation in some populations, with the use of phone applications and wearable self-monitoring technologies such as continuous glucose monitors and activity trackers providing consolidated, useful and potentially motivating feedback to the user (Collado-Mateo et al., 2021; Thielen et al., 2023).

Given the complex barriers to physical activity experienced by those living with CHCs, tailored programmes with personalised support are crucial. Although barriers and facilitators to activity for this broad population have been discussed, it is important to explore and deeply consider each individual's barriers to, and facilitators of, physical activity (Collado-Mateo et al., 2021; Williamson et al., 2021). Physical activity programmes need to apply individualised advice regarding physical activity frequency, intensity, type and duration depending on the needs and goals of the person (Collado-Mateo et al., 2021; M. J. Davies et al., 2022; Kunutsor & Laukkanen, 2024; Levy et al., 2024; Williamson et al., 2021).

Social prescribing is a relatively new strategy growing in popularity where health professionals refer people with CHCs to community groups, including physical activity and sports programmes, to improve their health and well-being (Costa et al., 2021; Kurpas et al., 2023). Khan et al. (2012) encourages social prescribing to sports clubs, citing a number of successful examples in Europe and abroad. Promoting physical activity within a sports club setting can provide a familiar, non-clinical and social setting which is showing promise in attracting more people living with CHCs (Krustrup & Krustrup, 2018; Lackinger et al., 2015). There is growing support for movements merging the medical and fitness/sports sectors in an effort to promote health-enhancing physical

activity, particularly in those with CHCs (Khan et al., 2012; Krustrup & Krustrup, 2018; Lackinger et al., 2015; Pedišić, 2025). The Sports Club for Health (SCforH) movement in the European Union has long been promoting sport as a vessel for health-enhancing physical activity, with 76 examples of SCforH initiatives from 33 European countries (Pedišić, 2025). The SCforH movement call for greater awareness of the SCforH guidelines among stakeholders and continued capacity building in the sports and health sectors (Pedišić, 2025).

Sports for People with CHCs

In order to make sport a reality for all and attract people living with CHCs to sport, considerations of the above mentioned barriers and facilitators to activity are key (Khan et al., 2012). Although studies have shown sports and physical activity to be most effective in managing T2D, CVD and hypertension when performed at higher intensities (for example, football as a form of high intensity activity), these intensities will not be suitable for all, primarily due to risk of cardiac events and injury, and may not be a person's preferred choice (Bennike et al., 2024; Khan et al., 2012; Kunutsor & Laukkanen, 2024; Oja et al., 2015). For example, people living with T2D experience an increased risk of tendon injury, fracture risk and can experience accelerated progression and severity of osteoarthritis as a result of metabolic dysfunction (Nichols et al., 2020).

A meta-analysis of recreational football interventions found that the total time spent in a high aerobic intensity zone (>90% HRmax) ranged from one-tenth to one-third of overall exercise time (Milanović et al., 2019). For sports like football (and others) to be more accessible to those living with CHCs, who may not be accustomed to such high intensities or may not be able to exercise at these intensities due to other comorbidities and risks, options for lower intensity participation are important. Walking, typically performed at low to moderate intensities, has been shown to be a safe, popular and effective activity for health and all-cause mortality risk reduction (Kelly et al., 2014; Kunutsor & Laukkanen, 2024). Walking-sports (for example walking football) as well as other sports tailored to individual needs may be an effective way to make sports more accessible for people living with CHCs who may not be ready for more traditional forms of sport (Bennike et al., 2024; Egger et al., 2024; Huebschmann et al., 2011; Madsen et al., 2021; Reddy et al., 2017). Although the health benefits of sport are becoming more well defined in the CHC population and appear to be a promising environment to address many of the psycho-social barriers to physical activity experienced by this population, more research is needed to fully explore the use of tailored sport (at lower intensities) in the management of CHCs.

Policies and Practices in Belgium, Italy, Kosovo and Romania

There are a number of EU policies which serve to promote physical activity, including the Tartu Call for a Healthy Lifestyle and the EU Work Plan for Sport (Council of the European

Union, 2020; European Commission, 2017). All EU countries have at least one national policy or action plan on physical activity promotion (Ritchie et al., 2024). However, when surveyed, national diabetes associations in Cyprus, Latvia, Romania, Slovakia and Spain indicted that physical activity policies were either not available or not impactful (International Diabetes Federation - Europe, 2025). Similar sentiments were shared by Romanian sports club representatives, stating that although policies exist, implementation is often fragmented and inconsistent across national regions. This discrepancy may indicate gaps in policy implementation and awareness in some countries. The European Commission has three main priorities in sport, one of which is participation in sport and health-enhancing physical activity (European Commission, 2024). As part of the EU Commission's Healthier Together initiative, Ritchie et al. (2024) indicate that 16 EU countries have endorsed promoting physical activity as a priority area for NCD prevention. EU4health is another example of an EU initiative promoting physical activity to prevent and manage NCDs (Andrade et al., 2025).

With respect to the European countries involved in the MOVEUP project, Italy, Romania and Belgium all have active policies towards physical activity promotion. Kosovo, while not part of the EU, is working towards aligning with EU initiatives and does benefit and contribute to EU programmes such as Erasmus+. Kosovo's Ministry for Sport, with the support of the Kosovo Olympic Committee, Sports Federations and other institutions has developed a strategy and action plan on sport development (European Commission of the Regions, n.d).

In Italy, although there is no formal national Government coordination mechanism, the Ministry of Health, Ministry of Education, Department for Sport at the Presidency of the Council of Ministers and National Olympic and Paralympic Committees are all contributing to health-enhancing physical activity (World Health Organization - European Region, 2024b). The 2024 Sport Report demonstrates collaboration between the Institute for Sports and Cultural Credit and Sport e Salute through a project supported by the Minister for Sport and Youth and the Department of Sport aiming to establish a national observatory dedicated to the sports sector (Sport e Salute & ICSC, 2024). Italy has active policies/action plans for physical activity promotion for health which include the National Prevention Plan 2020-2025 and Essential Levels of Assistance in the National Health System which both target people with CHC, as well as Gaining Health: Making Healthy Choices Easy which targets the general population (World Health Organization - European Region, 2024b). Italy's National Prevention Plan promotes counselling on physical activity by health professionals in public and private sectors, in primary care and hospitals (World Health Organization - European Region, 2024b).

Since 2014, Romania has had a designated Interministerial Working Group for Physical Activity Promotion to foster health enhancing physical activity (World Health Organization - European Region, 2024c). Romania's National Health Strategy 2023-2030 – For Health, Together and the National Programme of Health Promotion and Evaluation and Education for Health both target physical activity promotion for health and have involved the health sector in their design (World Health Organization - European Region,

2024c). Other policies and plans targeting physical activity promotion include School Sports national Olympiad, National Strategy for Sports 2023-2032 and Sustainable Urban Mobility Plans 2016-2030. In Romania, regulations governing the social health insurance system promote access to preventative health consultations where doctors provide advice on physical activity (this level of primary healthcare is available for both insured and uninsured people) (World Health Organization - European Region, 2024c).

There are a number of government coordination mechanisms for the promotion of physical activity in Belgium. The Flemish Ministry for Health and the Flanders Institute for Healthy Living coordinate health enhancing physical activity, while the sport ministries coordinate Belgium Health Enhancing Physical Activity Coordination (World Health Organization - European Region, 2024a). Belgium has many policies and action plans to target physical activity promotion. Of 13, there are six which specifically target physical activity for people living with CHC: Educational goals for health, Sport en Inclusie (Masterplan Inclusion In and Through Sport), MOEV – Sports and Physical Activity Moves Your School, Organised Sports Sector in Flanders: Policy Focus on Disadvantaged Groups, Strategic Plan 'Flemish Live Healthier in 2025' and Strategic Vision Statement 2030 on Sports Promotion (World Health Organization - European Region, 2024a). Sport sur ordonnance (Sport on Prescription) is a Belgian initiative encouraging and enabling doctors to prescribe physical activity for people living with CHCs as part of their overall management and treatment plan. This includes access to supervised physical activity with a qualified instructor (World Health Organization - European Region, 2024a). Another project encouraging physical activity for health management is Maison sports bien-être (Sports well-being house), organised by the Ministry of Sport of the French-speaking community, which uses multidisciplinary structures (medical, sports, social) to personalise physical activity support for people starting or resuming physical activity (World Health Organization - European Region, 2024a). Funded by the Flemish Ministry of Health, a similar project of the same name (Sports well-being house) supports healthcare professionals to refer people to a physical activity coach for tailored and individualised physical activity and counselling (World Health Organization - European Region, 2024a).

Despite the existence of physical activity and NCD policies and action plans throughout Europe, physical inactivity, particularly in those living with CHC remains high (Cassidy et al., 2016; Mortensen et al., 2023; Vasankari et al., 2018). Avoidable mortality from NCDs cost the EU region in excess of US$ 514 billion per year, with over 60% of this cost caused by preventable mortality (World Health Organization - European Region, 2025). Despite the preventable nature of this burden, countries in the EU region only spent, on average 2.5% of their current health expenditure in 2019 on preventative services, including physical activity promotion (World Health Organization - European Region, 2025). Ritchie et al. (2024) position social value as a useful framing to enhance physical activity promotion within Europe. The authors highlight that existing policies within the EU lack holistic recognition of the social value of physical activity, explaining that policies from the health sector are particularly limited in acknowledging the broader benefits of physical activity (Ritchie et al., 2024). Khan et al. (2012) supports calls for changes in

systems for delivery of care “so that physical activity counselling and referral are expected, documented and reimbursed” (p. 63). In line with recommendations voiced by Ritchie et al. (2024), highlighting the boarder co-benefits and value of physical activity across health, environment, social and community domains are key in physical activity narratives for policy change. Positioning the social value of physical activity through sport, where there are visible and widely accepted illustrations of social value, is a logical place to start.

Conclusion

This literature review underscores the substantial and multifaceted role of physical activity and sport in both the prevention and management of CVD and T2D. The evidence consistently shows that regular physical activity, across different intensities and formats can significantly reduce risk, improve health outcomes and enhance quality of life. Sport offers a unique and socially engaging vehicle for physical activity, with recreational and tailored formats providing accessible, enjoyable and effective options for people living with CHCs.

Despite compelling evidence and emerging policy support across Europe, particularly in Belgium, Italy, Romania and Kosovo, high levels of inactivity persist among people with CVD and T2D. This highlights a pressing need for more inclusive, theory-driven and person-centred approaches to physical activity participation. Addressing the physical, psychological and environmental barriers to activity, while leveraging key facilitators such as social support, self-efficacy, motivation and tailored programming is critical to increasing physical activity participation among those living with CHCs.

To truly harness the preventive and therapeutic potential of physical activity and sport, healthcare systems, policymakers and community organisations must work together to embed these strategies into standard care pathways and everyday life. Positioning sport as an accessible, health-enhancing approach to physical activity and recognising its broader social, economic and health benefits may be instrumental in advocating for and designing programmes to address inactivity in those living with CHCs.

References

Abbate, M., Gallardo-Alfaro, L., Bibiloni, M. d. M., & Tur, J. A. (2020). Efficacy of dietary intervention or in combination with exercise on primary prevention of cardiovascular disease: A systematic review. *Nutrition, Metabolism and Cardiovascular Diseases*, *30*(7), 1080-1093. https://doi.org/10.1016/j.numecd.2020.02.020

Alves, A. J., Viana, J. L., Cavalcante, S. L., Oliveira, N. L., Duarte, J. A., Mota, J., Oliveira, J., & Ribeiro, F. (2016). Physical activity in primary and secondary prevention of cardiovascular disease: Overview updated. *World Journal of Cardiology*, *8*(10), 575-583. https://doi.org/10.4330/wjc.v8.i10.575

Alves, A. J., Viana, J. L., Ribeiro, F., Alves, A. J., Viana, J. L., Cavalcante, S. L., Oliveira, N. L., Duarte, J. A., Mota, J., Oliveira, J., & Ribeiro, F. (2016). Physical activity in primary and secondary prevention of cardiovascular disease: Overview updated. *World journal of cardiology.*, *8*(10), 575-583. https://doi.org/10.4330/wjc.v8.i10.575

Andersen, T. R., Schmidt, J. F., Thomassen, M., Hornstrup, T., Frandsen, U., Randers, M. B., Hansen, P. R., Krustrup, P., & Bangsbo, J. (2014). A preliminary study: Effects of football training on glucose control, body composition, and performance in men with type 2 diabetes. *Scandinavian journal of medicine & science in sports*, *24*(S1), 43-56. https://doi.org/10.1111/sms.12259

Anderson, L., Thompson, D. R., & Oldridge, N. (2016). Exercise-based cardiac rehabilitation for coronary heart disease. *Cochrane Database Syst Rev*, *2016*(1), CD001800.

Andrade, C. A. S., Lovas, S., Mahrouseh, N., Chamouni, G., Shahin, B., Mustafa, E. O. A., Muhlis, A. N. A., Njuguna, D. W., Israel, F. E. A., Gammoh, N., Chandrika, N., Atuhaire, N. C., Ashkar, I., Chatterjee, A., Charles, R., Alzuhaily, H., Almusfy, A., Díaz Benavides, D., Alshakhshir, F. K., & Varga, O. (2025). Primary Prevention of Type 2 Diabetes Mellitus in the European Union: A Systematic Review of Interventional Studies. *Nutrients*, *17*(6), 1053. https://www.mdpi.com/2072-6643/17/6/1053

Aune, D., Norat, T., Leitzmann, M., Tonstad, S., & Vatten, L. J. (2015). Physical activity and the risk of type 2 diabetes: a systematic review and dose–response meta-analysis. *European Journal of Epidemiology*, *30*(7), 529-542. https://doi.org/10.1007/s10654-015-0056-z

Becchetti, L., Giachin Ricca, E., & Pelloni, A. (2012). The relationship between social leisure and life satisfaction: Causality and policy implications. *Social indicators research*, *108*, 453-490.

Bennike, S., Andersen, T. R., & Krustrup, P. (2024). *Football as prevention and treatment: A white paper focusing on 10 non-communicable diseases and risk factors*. https://www.sdu.dk/en/fim

Bjarnason-Wehrens, B., Schwaab, B., Reiss, N., & Schmidt, T. (2022). Resistance Training in Patients With Coronary Artery Disease, Heart Failure, and Valvular Heart Disease A REVIEW WITH SPECIAL EMPHASIS ON OLD AGE, FRAILTY, AND PHYSICAL LIMITATIONS. *Journal of Cardiopulmonary Rehabilitation and Prevention*, *42*(5), 304-315. https://doi.org/10.1097/hcr.0000000000000730

Boden, W. E., Franklin, B., Berra, K., Haskell, W. L., Calfas, K. J., Zimmerman, F. H., & Wenger, N. K. (2014). Exercise as a Therapeutic Intervention in Patients with Stable Ischemic Heart Disease: An Underfilled Prescription. *American Journal of Medicine*, *127*(10), 905-911. https://doi.org/10.1016/j.amjmed.2014.05.007

Boonpor, J., Parra-Soto, S., Petermann-Rocha, F., Lynskey, N., Cabanas-Sánchez, V., Sattar, N., Gill, J. M. R., Welsh, P., Pell, J. P., Gray, S. R., Ho, F. K., & Celis-Morales, C. (2023). Dose–response relationship between device-measured physical activity and incident type 2 diabetes: findings from the UK Biobank prospective cohort study. *BMC Medicine*, *21*(1), 191. https://doi.org/10.1186/s12916-023-02851-5

Booth, A. O., Lowis, C., Dean, M., Hunter, S. J., & McKinley, M. C. (2013). Diet and physical activity in the self-management of type 2 diabetes: barriers and facilitators identified by patients and health professionals. *PRIMARY HEALTH CARE RESEARCH AND DEVELOPMENT*, *14*(3), 293-306. https://doi.org/10.1017/S1463423612000412

Brauer, M., Roth, G. A., Aravkin, A. Y., Zheng, P., Abate, K. H., Abate, Y. H., Abbafati, C., Abbasgholizadeh, R., Abbasi, M. A., Abbasian, M., Abbasifard, M., Abbasi-Kangevari, M., Abd ElHafeez, S., Abd-Elsalam, S., Abdi, P., Abdollahi, M., Abdoun, M., Abdulah, D. M., Abdullahi, A., . . . Gakidou, E. (2024). Global burden and strength of evidence for 88 risk factors in 204 countries and 811 subnational locations, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021. *The Lancet*, *403*(10440), 2162-2203. https://doi.org/https://doi.org/10.1016/S0140-6736(24)00933-4

Bullard, T., Ji, M., An, R., Trinh, L., Mackenzie, M., & Mullen, S. P. (2019). A systematic review and meta-analysis of adherence to physical activity interventions among three chronic conditions: cancer, cardiovascular disease, and diabetes. *BMC Public Health*, *19*(1), 636. https://doi.org/10.1186/s12889-019-6877-z

Bytyci Katanolli, A., Probst-Hensch, N., Ann Obas, K., Gerold, J., Zahorka, M., Jerliu, N., Ramadani, Q., Fota, N., & Merten, S. (2022). Perceived barriers to physical activity behaviour among patients with diabetes and hypertension in Kosovo: a qualitative study. *BMC Primary Care*, *23*(1), 257. https://doi.org/10.1186/s12875-022-01866-w

Campillo-Sánchez, J., Borrego-Balsalobre, F. J., Díaz-Suárez, A., & Morales-Baños, V. (2025). Sports and Sustainable Development: A Systematic Review of Their Contribution to the SDGs and Public Health. *Sustainability*, *17*(2), Article 562. https://doi.org/10.3390/su17020562

Cardona-Morrell, M., Rychetnik, L., Morrell, S. L., Espinel, P. T., & Bauman, A. (2010). Reduction of diabetes risk in routine clinical practice: are physical activity and nutrition interventions feasible and are the outcomes from reference trials replicable? A systematic review and meta-analysis. *BMC Public Health*, *10*, 653. https://doi.org/10.1186/1471-2458-10-653

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public Health Rep*, *100*(2), 126-131.

Cassidy, S., Chau, J. Y., Catt, M., Bauman, A., & Trenell, M. I. (2016). Cross-sectional study of diet, physical activity, television viewing and sleep duration in 233 110 adults from the UK Biobank; the behavioural phenotype of cardiovascular disease and type 2 diabetes. *BMJ Open*, *6*(3), e010038. https://doi.org/10.1136/bmjopen-2015-010038

Colberg, S. R., Sigal, R. J., Yardley, J. E., Riddell, M. C., Dunstan, D. W., Dempsey, P. C., Horton, E. S., Castorino, K., & Tate, D. F. (2016). Physical Activity/Exercise and Diabetes: A Position Statement of the American Diabetes Association. *Diabetes Care*, *39*(11), 2065-2079. https://doi.org/10.2337/dc16-1728

Collado-Mateo, D., Lavín-Pérez, A. M., Peñacoba, C., Del Coso, J., Leyton-Román, M., Luque-Casado, A., Gasque, P., Fernández-del-Olmo, M. A., & Amado-Alonso, D. (2021). Key Factors Associated with Adherence to Physical Exercise in Patients with Chronic Diseases and Older Adults: An Umbrella Review. *International Journal of Environmental Research and Public Health*, *18*(4), Article 2023. https://doi.org/10.3390/ijerph18042023

Cornelissen, V. A., & Smart, N. A. (2013). Exercise Training for Blood Pressure: A Systematic Review and Meta-analysis. *Journal of the American Heart Association*, *2*(1), e004473. https://doi.org/10.1161/JAHA.112.004473

Cornish, A. K., Broadbent, S., & Cheema, B. S. (2011). Interval training for patients with coronary artery disease: a systematic review. *Eur J Appl Physiol*, *111*(4), 579-589. https://doi.org/10.1007/s00421-010-1682-5

Costa, A., Sousa, C. J., Seabra, P. R. C., Virgolino, A., Santos, O., Lopes, J., Henriques, A., Nogueira, P., & Alarcão, V. (2021). Effectiveness of Social Prescribing Programs in the Primary Health-Care Context: A Systematic Literature Review. *Sustainability*, *13*(5), 2731. https://www.mdpi.com/2071-1050/13/5/2731

Council of the European Union. (2020). *Resolution of the Council and of the Representatives of the Governments of the Member States meeting within the Council on the European Union Work Plan for Sport (1 January 2021–30 June 2024) 2020/C 419/01*. https://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=CELEX:42020Y1204(01)

Dąbek, J., Knapik, A., Gallert-Kopyto, W., Brzęk, A. M., Piotrkowicz, J., & Gąsior, Z. (2020). Fear of movement (kinesiophobia)–an underestimated problem in Polish patients at various stages of coronary artery disease. *Annals of agricultural and environmental medicine*, *27*(1), 56-60.

Dassanayake, S., Sole, G., Wilkins, G., Gray, E., & Skinner, M. (2022). Effectiveness of Physical Activity and Exercise on Ambulatory Blood Pressure in Adults with Resistant Hypertension: A Systematic Review and Meta-Analysis. *High Blood Pressure & Cardiovascular Prevention*, *29*(3), 275-286. https://doi.org/10.1007/s40292-022-00517-6

Davies, L. E. (2022). *Social return on investment of sport in the Wallonia-Brussels Federation: Final report*. Sheffield Hallam University; Vrije Universiteit Brussel; Université catholique de Louvain. https://refer.cfwb.be/documents/SROI_FWB_final%20report.pdf

Davies, M. J., Aroda, V. R., Collins, B. S., Gabbay, R. A., Green, J., Maruthur, N. M., Rosas, S. E., Del Prato, S., Mathieu, C., Mingrone, G., Rossing, P., Tankova, T., Tsapas, A., & Buse, J. B. (2022). Management of hyperglycaemia in type 2 diabetes, 2022. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetologia*, *65*(12), 1925-1966. https://doi.org/10.1007/s00125-022-05787-2

de Boer, W., Corpeleijn, E., Dekker, L., Mierau, J., & Koning, R. (2021). How is sport participation related to mortality, diabetes and prediabetes for different body mass index levels? *Scandinavian Journal of Medicine & Science in Sports*, *31*(6), 1342-1351. https://doi.org/https://doi.org/10.1111/sms.13940

de Sousa, M. V., Fukui, R., Krustrup, P., Dagogo-Jack, S., & da Silva, M. E. R. (2017). Combination of recreational soccer and caloric restricted diet reduces markers of protein catabolism and cardiovascular risk in patients with type 2 diabetes. *The Journal of nutrition, health & aging*, *21*(2), 180-186. https://doi.org/10.1007/s12603-015-0708-4

Dempsey, P. C., Friedenreich, C. M., Leitzmann, M. F., Buman, M. P., Lambert, E., Willumsen, J., & Bull, F. (2021). Global Public Health Guidelines on Physical Activity and Sedentary Behavior for People Living With Chronic Conditions: A Call to Action. *Journal of Physical Activity and Health*, *18*(1), 76-85. https://doi.org/10.1123/jpah.2020-0525

Diabetes Canada Clinical Practice Guidelines Expert Committee. (2018). Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada. *Canadian Journal of Diabettes*, *42*, S1-S325.

Dibben, G., Faulkner, J., Oldridge, N., Rees, K., Thompson, D. R., Zwisler, A. D., & Taylor, R. S. (2021). Exercise-based cardiac rehabilitation for coronary heart disease. *Cochrane Database Syst Rev*, *11*(11), Cd001800. https://doi.org/10.1002/14651858.CD001800.pub4

Dolan, P., Kavetsos, G., & Vlaev, I. (2014). The happiness workout. *Social indicators research*, *119*, 1363-1377.

Downward, P., Hallmann, K., & Rasciute, S. (2017). Exploring the interrelationship between sport, health and social outcomes in the UK: implications for health policy. *European Journal of Public Health*, *28*(1), 99-104. https://doi.org/10.1093/eurpub/ckx063

Downward, P., & Rasciute, S. (2011). Does sport make you happy? An analysis of the well-being derived from sports participation. *International review of applied economics*, *25*(3), 331-348.

Duclos, M., Dejager, S., Postel-Vinay, N., di Nicola, S., Quéré, S., & Fiquet, B. (2015). Physical activity in patients with type 2 diabetes and hypertension--insights into motivations and barriers from the MOBILE study. *Vasc Health Risk Manag*, *11*, 361-371. https://doi.org/10.2147/vhrm.S84832

Egger, F., Ditscheid, A., Schwarz, M., & Meyer, T. (2024). Physical Demands of Walking Football in Patients With Cardiovascular Risk Factors and Diseases. *Clinical Journal of Sport Medicine*, *34*(5). https://journals.lww.com/cjsportsmed/fulltext/2024/09000/physical_demands_of_walking_football_in_patients.10.aspx

Eigenschenk, B., Thomann, A., McClure, M., Davies, L., Gregory, M., Dettweiler, U., & Inglés, E. (2019). Benefits of Outdoor Sports for Society. A Systematic Literature Review and Reflections on Evidence. *International Journal of Environmental Research and Public Health*, *16*(6), Article 937. https://doi.org/10.3390/ijerph16060937

Eime, R. M., Young, J. A., Harvey, J. T., Charity, M. J., & Payne, W. R. (2013). A systematic review of the psychological and social benefits of participation in sport for adults: informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity*, *10*(1), 135. https://doi.org/10.1186/1479-5868-10-135

Ekelund, U., Tarp, J., Fagerland, M. W., Johannessen, J. S., Hansen, B. H., Jefferis, B. J., Whincup, P. H., Diaz, K. M., Hooker, S., Howard, V. J., Chernofsky, A., Larson, M. G., Spartano, N., Vasan, R. S., Dohrn, I.-M., Hagströmer, M., Edwardson, C., Yates, T., Shiroma, E. J., . . . Lee, I.-M. (2020). Joint associations of accelerometer-measured physical activity and sedentary time with all-cause mortality: a harmonised meta-analysis in more than 44 000 middle-aged and older individuals. *British Journal of Sports Medicine*, *54*(24), 1499-1506. https://doi.org/10.1136/bjsports-2020-103270

Ekelund, U., Tarp, J., Steene-Johannessen, J., Hansen, B. H., Jefferis, B., Fagerland, M. W., Whincup, P., Diaz, K. M., Hooker, S. P., Chernofsky, A., Larson, M. G., Spartano, N., Vasan, R. S., Dohrn, I.-M., Hagströmer, M., Edwardson, C., Yates, T., Shiroma, E., Anderssen, S. A., & Lee, I.-M. (2019). Dose-response associations between accelerometry measured physical activity and sedentary time and all cause mortality: systematic review and harmonised meta-analysis. *BMJ*, *366*, l4570. https://doi.org/10.1136/bmj.l4570

Elliott, A. D., Rajopadhyaya, K., Bentley, D. J., Beltrame, J. F., & Aromataris, E. C. (2015). Interval training versus continuous exercise in patients with coronary artery disease: a meta-analysis. *Heart, Lung and Circulation*, *24*(2), 149-157.

European Commission. (2017). *Tartu call for a healthy lifestyle*. https://sport.ec.europa.eu/sites/default/files/ewos-tartu-call_en.pdf

European Commission. (2024). *Sport. For community cohesion and social inclusion*. https://sport.ec.europa.eu/policies

European Commission of the Regions. (n.d). *Kosovo - Youth and Sport*. https://portal.cor.europa.eu/divisionpowers/Pages/Kosovo-Youth-and-sports.aspx

European Heart Network. (2019). *Physical activity policies for cardiovascular health*. European Heart Network. http://www.ehnheart.org/ publications-and-papers/publications/1243:physical-activitypolicies-for-cardiovascular-health.html

Eurostat. (2024). *Cardiovascular diseases statistics*. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Cardiovascular_diseases_statistics#Deaths_from_cardiovascular_diseases

Fan, Y. X., Yu, M. L., Li, J. E., Zhang, H., Liu, Q. Y., Zhao, L., Wang, T., & Xu, H. (2021). Efficacy and Safety of Resistance Training for Coronary Heart Disease Rehabilitation:

A Systematic Review of Randomized Controlled Trials. *Frontiers in Cardiovascular Medicine*, *8*, Article 754794. https://doi.org/10.3389/fcvm.2021.754794

Hafner, M., Yerushalmi, E., Stepanek, M., Phillips, W., Pollard, J., Deshpande, A., Whitmore, M., Millard, F., Subel, S., & van Stolk, C. (2020). Estimating the global economic benefits of physically active populations over 30 years (2020–2050). *British Journal of Sports Medicine*, *54*(24), 1482. https://doi.org/10.1136/bjsports-2020-102590

Hemmingsen, B., Gimenez-Perez, G., Mauricio, D., Roqué i Figuls, M., Metzendorf, M. I., & Richter, B. (2017). Diet, physical activity or both for prevention or delay of type 2 diabetes mellitus and its associated complications in people at increased risk of developing type 2 diabetes mellitus. *Cochrane Database of Systematic Reviews*(12). https://doi.org/10.1002/14651858.CD003054.pub4

Hoevenaar-Blom, M. P., Wendel-Vos, G. C. W., Verschuren, W. M. M., Hoevenaar-Blom, M. P., Wendel-Vos, G. C. W., Spijkerman, A. M. W., Kromhout, D., & Verschuren, W. M. M. (2011). Cycling and sports, but not walking, are associated with 10-year cardiovascular disease incidence: the MORGEN Study. *European journal of cardiovascular prevention and rehabilitation : official journal of the European Society of Cardiology, Working Groups on Epidemiology & Prevention and Cardiac Rehabilitation and Exercise Physiology.*, *18*(1), 41-47. https://doi.org/10.1097/HJR.0b013e32833bfc87

Hordern, M. D., Dunstan, D. W., Prins, J. B., Baker, M. K., Singh, M. A. F., & Coombes, J. S. (2012). Exercise prescription for patients with type 2 diabetes and pre-diabetes: A position statement from Exercise and Sport Science Australia. *Journal of Science and Medicine in Sport*, *15*(1), 25-31. https://doi.org/10.1016/j.jsams.2011.04.005

Hou, L. Y., Wang, Q., Pan, B., Li, R., Li, Y. F., He, J. J., Qin, T. Z., Cao, L. J., Zhang, N., Cao, C. H., Ge, L., & Yang, K. H. (2023). Exercise modalities for type 2 diabetes: A systematic review and network meta-analysis of randomized trials. *Diabetes-Metabolism Research and Reviews*, *39*(1). https://doi.org/10.1002/dmrr.3591

Huai, P., Xun, H., Reilly, K. H., Wang, Y., Ma, W., & Xi, B. (2013). Physical Activity and Risk of Hypertension. *Hypertension*, *62*(6), 1021-1026. https://doi.org/10.1161/HYPERTENSIONAHA.113.01965

Huang, H., & Humphreys, B. R. (2012). Sports participation and happiness: Evidence from US microdata. *Journal of economic Psychology*, *33*(4), 776-793.

Huebschmann, A. G., Crane, L. A., Belansky, E. S., Scarbro, S., Marshall, J. A., & Regensteiner, J. G. (2011). Fear of Injury With Physical Activity Is Greater in Adults With Diabetes Than in Adults Without Diabetes. *Diabetes Care*, *34*(8), 1717-1722. https://doi.org/10.2337/dc10-1801

Hussain, S. R., Macaluso, A., & Pearson, S. J. (2016). High-Intensity Interval Training Versus Moderate-Intensity Continuous Training in the Prevention/Management of Cardiovascular Disease. *Cardiology in Review*, *24*(6), 273-281. https://doi.org/10.1097/crd.0000000000000124

Inder, J. D., Carlson, D. J., Dieberg, G., McFarlane, J. R., Hess, N. C., & Smart, N. A. (2016). Isometric exercise training for blood pressure management: a systematic review and meta-analysis to optimize benefit. *Hypertens Res*, *39*(2), 88-94. https://doi.org/10.1038/hr.2015.111

International Diabetes Federation. (2025a). *Europe - Diabetes regional report 2000 — 2050*. International Diabetes Federation https://diabetesatlas.org/data-by-location/region/europe/

International Diabetes Federation. (2025b). *IDF diabetes atlas 11th edition 2025*. https://diabetesatlas.org/resources/idf-diabetes-atlas-2025/

International Diabetes Federation - Europe. (2025). *An overview of access to diabetes care in Europe: IDF Europe Compendium of Country Profiles*.

https://idf.org/europe/media/uploads/sites/2/2025/04/IDF-Europe-Compendium_Final-003.pdf

International Sport and Culture Association / Cebr. (2015). *The economic cost of physical inactivity in Europe*. https://inactivity-time-bomb.nowwemove.com/download-report/The%20Economic%20Costs%20of%20Physical%20Inactivity%20in%20Europe%20(June%202015).pdf

Janevic, M. R., McLaughlin, S. J., & Connell, C. M. (2012). Overestimation of Physical Activity Among a Nationally Representative Sample of Underactive Individuals With Diabetes. *Medical Care*, *50*(5), 441-445. https://doi.org/10.1097/MLR.0b013e3182422a52

Jayedi, A., Zargar, M.-S., Emadi, A., & Aune, D. (2024). Walking speed and the risk of type 2 diabetes: a systematic review and meta-analysis. *British Journal of Sports Medicine*, *58*(6), 334. https://doi.org/10.1136/bjsports-2023-107336

Jia, Y. Y., Cui, N. Q., Jia, T. T., Hamoudi, H., & Song, J. P. (2024). Measurement properties of assessment tools of Kinesophobia in patients with cardiovascular disease: A systematic review. *International Journal of Nursing Sciences*, *11*(1), 57-65. https://doi.org/10.1016/j.ijnss.2023.12.016

Jin, Y. Z., Yan, S., & Yuan, W. X. (2017). Effect of isometric handgrip training on resting blood pressure in adults: a meta-analysis of randomized controlled trials. *J Sports Med Phys Fitness*, *57*(1-2), 154-160. https://doi.org/10.23736/s0022-4707.16.05887-4

Kanaley, J. A., Colberg, S. R., Zierath, J. R., Kanaley, J. A., Colberg, S. R., Corcoran, M. H., Malin, S. K., Rodriguez, N. R., Crespo, C. J., Kirwan, J. P., & Zierath, J. R. (2022). Exercise/Physical Activity in Individuals with Type 2 Diabetes: A Consensus Statement from the American College of Sports Medicine. *Medicine & science in sports & exercise.*, *54*(2), 353-368. https://doi.org/10.1249/MSS.0000000000002800

Kelly, P., Kahlmeier, S., Götschi, T., Orsini, N., Richards, J., Roberts, N., Scarborough, P., & Foster, C. (2014). Systematic review and meta-analysis of reduction in all-cause mortality from walking and cycling and shape of dose response relationship. *International Journal of Behavioral Nutrition and Physical Activity*, *11*(1), 132. https://doi.org/10.1186/s12966-014-0132-x

Kemps, H., Kränkel, N., Dörr, M., Moholdt, T., Wilhelm, M., Paneni, F., Serratosa, L., Ekker Solberg, E., Hansen, D., Halle, M., Guazzi, M., & Cardiology, o. b. o. t. E. A. o. P. (2020). Exercise training for patients with type 2 diabetes and cardiovascular disease: What to pursue and how to do it. A Position Paper of the European Association of Preventive Cardiology (EAPC). *European Journal of Preventive Cardiology*, *26*(7), 709-727. https://doi.org/10.1177/2047487318820420

Kennerly, A.-M., & Kirk, A. (2018). Physical activity and sedentary behaviour of adults with type 2 diabetes: a systematic review. *Practical Diabetes*, *35*(3), 86-89g. https://doi.org/https://doi.org/10.1002/pdi.2169

Khan, K. M., Thompson, A. M., Blair, S. N., Sallis, J. F., Powell, K. E., Bull, F. C., & Bauman, A. E. (2012). Sport and exercise as contributors to the health of nations. *The Lancet*, *380*(9836), 59-64. https://doi.org/10.1016/S0140-6736(12)60865-4

Knapik, A., Dąbek, J., & Brzęk, A. (2019). Kinesiophobia as a problem in adherence to physical activity recommendations in elderly polish patients with coronary artery disease. *Patient preference and adherence*, 2129-2135.

Knoepfli-Lenzin, C., Sennhauser, C., Toigo, M., Boutellier, U., Bangsbo, J., Krustrup, P., Junge, A., & Dvorak, J. (2010). Effects of a 12-week intervention period with football and running for habitually active men with mild hypertension. *Scandinavian journal of medicine & science in sports*, *20*(s1), 72-79. https://doi.org/10.1111/j.1600-0838.2009.01089.x

Kohl, H. W., 3rd, Craig, C. L., Lambert, E. V., Inoue, S., Alkandari, J. R., Leetongin, G., & Kahlmeier, S. (2012). The pandemic of physical inactivity: global action for public

health. *The Lancet*, *380*(9838), 294-305. https://doi.org/10.1016/S0140-6736(12)60898-8

Konerding, U., & Szel, C. (2021). Promoting physical activity in persons with type 2 diabetes mellitus: A systematic review of systematic reviews. *Patient Education and Counseling*, *104*(7), 1600-1607. https://doi.org/10.1016/j.pec.2020.12.011

Krustrup, P., & Krustrup, B. R. (2018). Football is medicine: it is time for patients to play! *Br J Sports Med*, *52*(22), 1412-1414. https://doi.org/10.1136/bjsports-2018-099377

Krustrup, P., Randers, M. B., Andersen, L. J., Jackman, S. R., Bangsbo, J., & Hansen, P. R. (2013). Soccer improves fitness and attenuates cardiovascular risk factors in hypertensive men. *Medicine and science in sports and exercise*, *45*(3), 553-560. https://doi.org/10.1249/MSS.0b013e3182777051

Kunutsor, S. K., & Laukkanen, J. A. (2024). Physical activity, exercise and adverse cardiovascular outcomes in individuals with pre-existing cardiovascular disease: a narrative review. *Expert Review of Cardiovascular Therapy*, *22*(1-3), 91-101. https://doi.org/10.1080/14779072.2024.2328644

Kurpas, D., Mendive, J. M., Vidal-Alaball, J., Petrazzuoli, F., Morad, M., Kloppe, T., Herrman, W., Mrduljaš-Đujić, N., & Kenkre, J. (2023). European Perspective on How Social Prescribing Can Facilitate Health and Social Integrated Care in the Community. *Int J Integr Care*, *23*(2), 13. https://doi.org/10.5334/ijic.7636

Kwan, M. L., Sternfeld, B., Ergas, I. J., Timperi, A. W., Roh, J. M., Hong, C.-C., Quesenberry, C. P., & Kushi, L. H. (2012). Change in physical activity during active treatment in a prospective study of breast cancer survivors. *Breast Cancer Research and Treatment*, *131*(2), 679-690. https://doi.org/10.1007/s10549-011-1788-4

Lackinger, C., Haider, S., Kautzky-Willer, A., Lackinger, C., Haider, S., Kosi, L., Harreiter, J., Winhofer, Y., & Kautzky-Willer, A. (2015). Potential of a Sports Club–Based Exercise Program for Improving Physical Activity in Type 2 Diabetes Mellitus. *Journal of physical activity & health.*, *12*(9), 1221-1228. https://doi.org/10.1123/jpah.2014-0199

Lee, I. M., Shiroma, E. J., Lobelo, F., Puska, P., Blair, S. N., & Katzmarzyk, P. T. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet*, *380*(9838), 219-229. https://doi.org/10.1016/s0140-6736(12)61031-9

Lee, J., Lee, R., & Stone, A. J. (2020). Combined Aerobic and Resistance Training for Peak Oxygen Uptake, Muscle Strength, and Hypertrophy After Coronary Artery Disease: a Systematic Review and Meta-Analysis. *Journal of Cardiovascular Translational Research*, *13*(4), 601-611. https://doi.org/10.1007/s12265-019-09922-0

Levy, T., Kelly, H., Sally, V., & and Lewis, L. K. (2024). Physical activity for people with chronic conditions: a systematic review of toolkits to promote adherence. *Disability and Rehabilitation*, *46*(22), 5199-5212. https://doi.org/10.1080/09638288.2023.2296525

Li, J., & Siegrist, J. (2012). Physical Activity and Risk of Cardiovascular Disease-A Meta-Analysis of Prospective Cohort Studies. *International Journal of Environmental Research and Public Health*, *9*(2), 391-407. https://doi.org/10.3390/ijerph9020391

Li, Q., Jiang, J. Q., Duan, A. Y., Hu, J., Li, L., & Chen, W. (2024). Physical activity experience of patients with hypertension: a systematic review and synthesis of qualitative literature. *Bmc Public Health*, *24*(1), Article 2826. https://doi.org/10.1186/s12889-024-20326-x

Liu, K., Daviglus, M. L., Loria, C. M., Colangelo, L. A., Spring, B., Moller, A. C., & Lloyd-Jones, D. M. (2012). Healthy Lifestyle Through Young Adulthood and the Presence of Low Cardiovascular Disease Risk Profile in Middle Age. *Circulation*, *125*(8), 996-1004. https://doi.org/10.1161/CIRCULATIONAHA.111.060681

Liu, X., Zhang, D., Liu, Y., Sun, X., Han, C., Wang, B., Ren, Y., Zhou, J., Zhao, Y., Shi, Y., Hu, D., & Zhang, M. (2017). Dose–Response Association Between Physical Activity and

Incident Hypertension. *Hypertension*, *69*(5), 813-820. https://doi.org/10.1161/HYPERTENSIONAHA.116.08994

Lopes, S., Félix, G., Mesquita-Bastos, J., Figueiredo, D., Oliveira, J., & Ribeiro, F. (2021). Determinants of exercise adherence and maintenance among patients with hypertension: a narrative review. *Reviews in Cardiovascular Medicine*, *22*(4), 1271-1278. https://doi.org/10.31083/j.rcm2204134

Lopes, S., Mesquita-Bastos, J., Alves, A. J., & Ribeiro, F. (2018). Exercise as a tool for hypertension and resistant hypertension management: current insights. *Integrated Blood Pressure Control*, *11*, 65-71. https://doi.org/10.2147/ibpc.S136028

Madsen, M., Peter, K., & and Larsen, M. N. (2021). Exercise intensity during walking football for men and women aged 60+ in comparison to traditional small-sided football – a pilot study. *Managing Sport and Leisure*, *26*(4), 259-267. https://doi.org/10.1080/23750472.2020.1762508

Mannucci, E., Bonifazi, A., & Monami, M. (2021). Comparison between different types of exercise training in patients with type 2 diabetes mellitus: A systematic review and network metanalysis of randomized controlled trials. *Nutrition Metabolism and Cardiovascular Diseases*, *31*(7), 1985-1992. https://doi.org/10.1016/j.numecd.2021.02.030

Marques, A., Santos, T., Martins, J., Matos, M. G. D., & Valeiro, M. G. (2018). The association between physical activity and chronic diseases in European adults. *European Journal of Sport Science*, *18*(1), 140-149. https://doi.org/10.1080/17461391.2017.1400109

Marzolini, S., Oh, P. I., & Brooks, D. (2012). Effect of combined aerobic and resistance training versus aerobic training alone in individuals with coronary artery disease: a meta-analysis. *Eur J Prev Cardiol*, *19*(1), 81-94. https://doi.org/10.1177/1741826710393197

McCarthy, M. M., Vaughan, V., & Chyun, D. (2011). Barriers to Cardiac Rehabilitation in Women With Cardiovascular Disease An Integrative Review. *Journal of Cardiovascular Nursing*, *26*(5), E1-E10. https://doi.org/10.1097/JCN.0b013e3181f877e9

Milanović, Z., Pantelić, S., Čović, N., Sporiš, G., & Krustrup, P. (2015). Is Recreational Soccer Effective for Improving VO2max A Systematic Review and Meta-Analysis. *Sports medicine (Auckland)*, *45*(9), 1339-1353. https://doi.org/10.1007/s40279-015-0361-4

Milanović, Z., Pantelić, S., Čović, N., Sporiš, G., Mohr, M., & Krustrup, P. (2019). Broad-spectrum physical fitness benefits of recreational football: a systematic review and meta-analysis. *British journal of sports medicine*, *53*(15), 926-939. https://doi.org/10.1136/bjsports-2017-097885

Mohr, M., Lindenskov, A., Holm, P. M., Nielsen, H. P., Mortensen, J., Weihe, P., & Krustrup, P. (2014). Football training improves cardiovascular health profile in sedentary, premenopausal hypertensive women. *Scandinavian journal of medicine & science in sports*, *24*(S1), 36-42. https://doi.org/10.1111/sms.12278

Momma, H., Kawakami, R., Honda, T., & Sawada, S. S. (2022). Muscle-strengthening activities are associated with lower risk and mortality in major non-communicable diseases: a systematic review and meta-analysis of cohort studies. *British Journal of Sports Medicine*, *56*(13), 755. https://doi.org/10.1136/bjsports-2021-105061

Morgan, A., Drew, D., Clifford, A., & Hull, K. (2017). Success of a sports-club led-community X-PERT Diabetes Education Programme. *Sport in society*, *20*(2), 269-280. https://doi.org/10.1080/17430437.2016.1173923

Mortensen, S. R., Skou, S. T., Brønd, J. C., Ried-Larsen, M., Petersen, T. L., Jørgensen, L. B., Jepsen, R., Tang, L. H., Bruun-Rasmussen, N. E., & Grøntved, A. (2023). Detailed descriptions of physical activity patterns among individuals with diabetes and prediabetes: ˇhe Lolland-Falster Health Study. *BMJ Open Diabetes Research & Care*, *11*(5), e003493. https://doi.org/10.1136/bmjdrc-2023-003493

Nicholls, J., Lawlor, E., Neitzert, E., & Goodspeed, T. (2012). A guide to social return on investment.

Nichols, A. E. C., Oh, I., & Loiselle, A. E. (2020). Effects of Type II Diabetes Mellitus on Tendon Homeostasis and Healing. *J Orthop Res*, *38*(1), 13-22. https://doi.org/10.1002/jor.24388

OECD/WHO. (2023). *Step Up! Tackling the burden of insufficient physical activity in Europe*. OECD Publishing. https://doi.org/10.1787/500a9601-en.

Oja, P., Kelly, P., Pedisic, Z., Titze, S., Bauman, A., Foster, C., Hamer, M., Hillsdon, M., & Stamatakis, E. (2017). Associations of specific types of sports and exercise with all-cause and cardiovascular-disease mortality: a cohort study of 80 306 British adults. *British Journal of Sports Medicine*, *51*(10), 812. https://doi.org/10.1136/bjsports-2016-096822

Oja, P., Titze, S., Kokko, S., Kujala, U. M., Heinonen, A., Kelly, P., Koski, P., & Foster, C. (2015). Health benefits of different sport disciplines for adults: systematic review of observational and intervention studies with meta-analysis. *British Journal of Sports Medicine*, *49*(7), 434. https://doi.org/10.1136/bjsports-2014-093885

Ottesen, L., Jeppesen, R. S., & Krustrup, B. R. (2010). The development of social capital through football and running: studying an intervention program for inactive women. *Scandinavian Journal of Medicine & Science in Sports*, *20*(s1), 118-131. https://doi.org/https://doi.org/10.1111/j.1600-0838.2010.01123.x

Pan, B., Ge, L., Xun, Y. Q., Chen, Y. J., Gao, C. Y., Han, X., Zuo, L. Q., Shan, H. Q., Yang, K. H., Ding, G. W., & Tian, J. H. (2018). Exercise training modalities in patients with type 2 diabetes mellitus: a systematic review and network meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *15*, Article 72. https://doi.org/10.1186/s12966-018-0703-3

Pedersen, B. K., & Saltin, B. (2015). Exercise as medicine – evidence for prescribing exercise as therapy in 26 different chronic diseases. *Scandinavian Journal of Medicine & Science in Sports*, *25*(S3), 1-72. https://doi.org/https://doi.org/10.1111/sms.12581

Pedišić, Ž. (2025). *Sports Club for Health (SCforH) movement in the European Union.* . Faculty of Kinesiology, University of Zagreb.

Pelliccia, A., Sharma, S., Gati, S., Bäck, M., Börjesson, M., Caselli, S., Collet, J.-P., Corrado, D., Drezner, J. A., Halle, M., Hansen, D., Heidbuchel, H., Myers, J., Niebauer, J., Papadakis, M., Piepoli, M. F., Prescott, E., Roos-Hesselink, J. W., Graham Stuart, A., . . . Group, E. S. D. (2020). 2020 ESC Guidelines on sports cardiology and exercise in patients with cardiovascular disease: The Task Force on sports cardiology and exercise in patients with cardiovascular disease of the European Society of Cardiology (ESC). *European Heart Journal*, *42*(1), 17-96. https://doi.org/10.1093/eurheartj/ehaa605

Perrin, N. E., Davies, M. J., Robertson, N., Snoek, F. J., & Khunti, K. (2017). The prevalence of diabetes-specific emotional distress in people with Type 2 diabetes: a systematic review and meta-analysis. *Diabetic Medicine*, *34*(11), 1508-1520. https://doi.org/https://doi.org/10.1111/dme.13448

Pescatello, L. S., Buchner, D. M., Jakicic, J. M., Powell, K. E., Kraus, W. E., Bloodgood, B., Campbell, W. W., Dietz, S., Dipietro, L., George, S. M., Macko, R. F., Mctiernan, A., Pate, R. R., & Piercy, K. L. (2019). Physical Activity to Prevent and Treat Hypertension: A Systematic Review. *Medicine & Science in Sports & Exercise*, *51*(6), 1314-1323. https://doi.org/10.1249/mss.0000000000001943

Piepoli, M. F., Hoes, A. W., Agewall, S., Albus, C., Brotons, C., Catapano, A. L., Cooney, M.-T., Corrà, U., Cosyns, B., Deaton, C., Graham, I., Hall, M. S., Hobbs, F. D. R., Løchen, M.-L., Löllgen, H., Marques-Vidal, P., Perk, J., Prescott, E., Redon, J., . . . Group, E. S. D. (2016). 2016 European Guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts)Developed with the special

contribution of the European Association for Cardiovascular Prevention and Rehabilitation (EACPR). *European Heart Journal*, *37*(29), 2315-2381. https://doi.org/10.1093/eurheartj/ehw106

Quested, E., Kritz, M., Hancox, J. E., Ntoumanis, N., & Thøgersen-Ntoumani,C. (2021). Promoting self-determined motivation for physical activity: From theory to intervention work. In Z. Zenko & L. Jones (Eds.), *Essentials of exercise and sport psychology: An open access textbook* (pp. 37–61). Society for Transparency, Openness, and Replication in Kinesiology. https://doi.org/10.51224/B1003

Quindry, J. C., Franklin, B. A., Chapman, M., Humphrey, R., & Mathis, S. (2019). Benefits and Risks of High-Intensity Interval Training in Patients With Coronary Artery Disease. *Am J Cardiol*, *123*(8), 1370-1377. https://doi.org/10.1016/j.amjcard.2019.01.008

Rao, P., Belanger, M. J., & Robbins, J. M. (2022). Exercise, Physical Activity, and Cardiometabolic Health: Insights into the Prevention and Treatment of Cardiometabolic Diseases. *Cardiology in Review*, *30*(4), 167-178. https://doi.org/10.1097/crd.0000000000000416

Rasciute, S., & Downward, P. (2010). Health or happiness? What is the impact of physical activity on the individual? *Kyklos*, *63*(2), 256-270.

Rashidi, A., Kaistha, P., Whitehead, L., & Robinson, S. (2020). Factors that influence adherence to treatment plans amongst people living with cardiovascular disease: A review of published qualitative research studies. *International Journal of Nursing Studies*, *110*, Article 103727. https://doi.org/10.1016/j.ijnurstu.2020.103727

Rebel Mulier Institute. (2019). *The Social Return on Investment (SROI) of sports and physical activity* Knowledge Centre for Sport Netherlands. https://www.kennisbanksportenbewegen.nl/?file=9527&m=1560425690&action=file.downl oad

Reddy, P., Dias, I., Holland, C., Campbell, N., Nagar, I., Connolly, L., Krustrup, P., & Hubball, H. (2017). Walking football as sustainable exercise for older adults - A pilot investigation. *Eur J Sport Sci*, *17*(5), 638-645. https://doi.org/10.1080/17461391.2017.1298671

Rijal, A., Adhikari, T. B., Dhakal, S., Maagaard, M., Piri, R., Nielsen, E. E., Neupane, D., Jakobsen, J. C., & Olsen, M. H. (2024). Effects of adding exercise to usual care on blood pressure in patients with hypertension, type 2 diabetes, or cardiovascular disease: a systematic review with meta-analysis and trial sequential analysis. *Journal of Hypertension*, *42*(1), 10-22. https://doi.org/10.1097/hjh.0000000000003589

Ritchie, I., Nieto, I., Brunn, M., Mayo, X., & Jimenez, A. (2024). Social value framing of physical activity in European Member State policies: a content analysis. *Front Sports Act Living*, *6*, 1415007. https://doi.org/10.3389/fspor.2024.1415007

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. The Guilford Press. https://doi.org/10.1521/978.14625/28806

Salzwedel, A., Jensen, K., Rauch, B., Doherty, P., Metzendorf, M.-I., Hackbusch, M., Völler, H., Schmid, J.-P., Davos, C. H., on behalf of the Cardiac Rehabilitation Section, E. A. o. P. C., in cooperation with the Institute of Medical Biometry, Informatics , D. o. M. B., University of Heidelberg,, Metabolic, t. C., & Endocrine Disorders Group, I. o. G. P., Heinrich-Heine University, Düsseldorf, Germany. (2020). Effectiveness of comprehensive cardiac rehabilitation in coronary artery disease patients treated according to contemporary evidence based medicine: Update of the Cardiac Rehabilitation Outcome Study (CROS-II). *European Journal of Preventive Cardiology*, *27*(16), 1756-1774. https://doi.org/10.1177/2047487320905719

Santiago de Araújo Pio, C., Chaves, G. S. S., Davies, P., Taylor, R. S., & Grace, S. L. (2019). Interventions to promote patient utilisation of cardiac rehabilitation. *Cochrane*

Database of Systematic Reviews(2). https://doi.org/10.1002/14651858.CD007131.pub4

Santos, A. C., Willumsen, J., Meheus, F., Ilbawi, A., & Bull, F. C. (2023). The cost of inaction on physical inactivity to public health-care systems: a population-attributable fraction analysis. *The Lancet Global Health*, *11*(1), e32-e39. https://doi.org/10.1016/S2214-109X(22)00464-8

Sattelmair, J., Pertman, J., Ding, E. L., Kohl, H. W., Haskell, W., & Lee, I. M. (2011). Dose Response Between Physical Activity and Risk of Coronary Heart Disease. *Circulation*, *124*(7), 789-795. https://doi.org/10.1161/CIRCULATIONAHA.110.010710

Schellenberg, E. S., Dryden, D. M., Vandermeer, B., Ha, C., & Korownyk, C. (2013). Lifestyle interventions for patients with and at risk for type 2 diabetes: a systematic review and meta-analysis. *Ann Intern Med*, *159*(8), 543-551. https://doi.org/10.7326/0003-4819-159-8-201310150-00007

Schuler, G., Adams, V., & Goto, Y. (2013). Role of exercise in the prevention of cardiovascular disease: results, mechanisms, and new perspectives. *European Heart Journal*, *34*(24), 1790-1799. https://doi.org/10.1093/eurheartj/eht111

Schultz, M. G., Currie, K. D., Hedman, K., Maiorana, A., Climie, R. E., Littlechild, D., Nelson, M. R., Coombes, J. S., & Sharman, J. E. (2025). Exercise and Sports Science Australia (ESSA) - Consensus Statement: Exercise blood pressure for the identification of uncontrolled hypertension: recommendations to support best-practice blood pressure management. *Journal of Science and Medicine in Sport*. https://doi.org/10.1016/j.jsams.2025.05.011

Semenkovich, K., Brown, M. E., Svrakic, D. M., & Lustman, P. J. (2015). Depression in Type 2 Diabetes Mellitus: Prevalence, Impact, and Treatment. *Drugs*, *75*(6), 577-587. https://doi.org/10.1007/s40265-015-0347-4

Semlitsch, T., Jeitler, K., Hemkens, L. G., Horvath, K., Nagele, E., Schuermann, C., Pignitter, N., Herrmann, K. H., Waffenschmidt, S., & Siebenhofer, A. (2013). Increasing Physical Activity for the Treatment of Hypertension: A Systematic Review and Meta-Analysis. *Sports Medicine*, *43*(10), 1009-1023. https://doi.org/10.1007/s40279-013-0065-6

Smith, A. D., Crippa, A., Woodcock, J., & Brage, S. (2016). Physical activity and incident type 2 diabetes mellitus: a systematic review and dose–response meta-analysis of prospective cohort studies. *Diabetologia*, *59*(12), 2527-2545. https://doi.org/10.1007/s00125-016-4079-0

Sport e Salute, & ICSC. (2024). *Rapporto Sport 2024*. https://www.sportesalute.eu/images/Rapporto-Sport-2024.pdf

Sport England. (2020). *Measuring the social impact of sport in England*. https://sportengland-production-files.s3.eu-west-2.amazonaws.com/s3fs-public/202009/Social%20return%20on%20investment.pdf?5BgvLn09jwpTesBJ4BXhVfRhV4TYgm9E

Sport Industry Research Centre. (2018). *Social return on investment in sport*. Sport Wales. https://www.sport.wales/content-vault/social-return-on-investment-in-sport/

Stamatakis, E., Gale, J., Bauman, A., Ekelund, U., Hamer, M., & Ding, D. (2019). Sitting Time, Physical Activity, and Risk of Mortality in Adults. *JACC*, *73*(16), 2062-2072. https://doi.org/doi:10.1016/j.jacc.2019.02.031

Taylor, P., Davies, L., Wells, P., Gilbertson, J., & Tayleur, W. (2015). *A review of the social impacts of culture and sport*. The Culture and Sport Evidence programme. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/416279/A_review_of_the_Social_Impacts_of_Culture_and_Sport.pdf

Teixeira, J., Krustrup, P., Castagna, C., Mohr, M., Ascensão, A., Pereira, R., Carneiro, I., Coelho, E., Martins, S., Guimarães, J. T., Oliveira, R., & Póvoas, S. (2023). Recreational futsal provides broad-spectrum fitness and health benefits but no blood

pressure effects in men with treated hypertension - a randomised controlled trial. *Journal of sports sciences*, *41*(20), 1824-1836. https://doi.org/10.1080/02640414.2023.2300568

Thielen, S. C., Reusch, J. E. B., & Regensteiner, J. G. (2023). A narrative review of exercise participation among adults with prediabetes or type 2 diabetes: barriers and solutions. *Frontiers in Clinical Diabetes and Healthcare*, *Volume 4 - 2023*. https://doi.org/10.3389/fcdhc.2023.1218692

Timmis, A., Aboyans, V., Vardas, P., Townsend, N., Torbica, A., Kavousi, M., Boriani, G., Huculeci, R., Kazakiewicz, D., Scherr, D., Karagiannidis, E., Cvijic, M., Kapłon-Cieślicka, A., Ignatiuk, B., Raatikainen, P., De Smedt, D., Wood, A., Dudek, D., Van Belle, E., . . . Societies, E. N. C. (2024). European Society of Cardiology: The 2023 Atlas of Cardiovascular Disease Statistics. *European Heart Journal*, *45*(38), 4019-4062. https://doi.org/10.1093/eurheartj/ehae466

United Nations Secretary General. (2025). *Progress on the prevention and control of non-communicable diseases and the promotion of mental health and well-being: Report of the Secretary-General*. United Nations. https://digitallibrary.un.org/record/4076846?ln=en&v=pdf#files

Uthman, O. A., Hartley, L., Rees, K., Taylor, F., Ebrahim, S., & Clarke, A. (2015). Multiple risk factor interventions for primary prevention of cardiovascular disease in low- and middle-income countries. *Cochrane Database of Systematic Reviews*(8). https://doi.org/10.1002/14651858.CD011163.pub2

Uusitupa, M., Khan, T. A., Viguiliouk, E., Kahleova, H., Rivellese, A. A., Hermansen, K., Pfeiffer, A., Thanopoulou, A., Salas-Salvadó, J., Schwab, U., & Sievenpiper, J. L. (2019). Prevention of Type 2 Diabetes by Lifestyle Changes: A Systematic Review and Meta-Analysis. *Nutrients*, *11*(11), 2611. https://www.mdpi.com/2072-6643/11/11/2611

Valero-Elizondo, J., Salami, J. A., Osondu, C. U., Ogunmoroti, O., Arrieta, A., Spatz, E. S., Younus, A., Rana, J. S., Virani, S. S., Blankstein, R., Blaha, M. J., Veledar, E., & Nasir, K. (2016). Economic impact of moderate-vigorous physical activity among those with and without established cardiovascular Ddsease: 2012 medical expenditure panel survey. *Journal of the American Heart Association*, *5*(9), e003614. https://doi.org/doi:10.1161/JAHA.116.003614

Vasankari, V., Halonen, J., Vasankari, T., Anttila, V., Airaksinen, J., Sievänen, H., & Hartikainen, J. (2021). Physical activity and sedentary behaviour in secondary prevention of coronary artery disease: A review. *American Journal of Preventive Cardiology*, *5*, Article 100146. https://doi.org/10.1016/j.ajpc.2021.100146

Vasankari, V., Husu, P., Vähä-Ypyä, H., Suni, J. H., Tokola, K., Borodulin, K., Wennman, H., Halonen, J., Hartikainen, J., Sievänen, H., & Vasankari, T. (2018). Subjects with cardiovascular disease or high disease risk are more sedentary and less active than their healthy peers. *BMJ Open Sport Exerc Med*, *4*(1), e000363. https://doi.org/10.1136/bmjsem-2018-000363

Vilafranca Cartagena, M., Tort-Nasarre, G., & Rubinat Arnaldo, E. (2021). Barriers and Facilitators for Physical Activity in Adults with Type 2 Diabetes Mellitus: A Scoping Review. *Int J Environ Res Public Health*, *18*(10). https://doi.org/10.3390/ijerph18105359

WHO Regional Office for Europe. (2024). *Be an empowering and supportive coach: Health Promoting Sports Coach implementation guide*. https://www.who.int/europe/publications/i/item/WHO-EURO-2024-10391-50163-75563

Williamson, T. M., Moran, C., McLennan, A., Seidel, S., Ma, P. P., Koerner, M. L., & Campbell, T. S. (2021). Promoting adherence to physical activity among individuals with cardiovascular disease using behavioral counseling: A theory and research-based

primer for health care professionals. *Progress in Cardiovascular Diseases*, *64*, 41-54. https://doi.org/10.1016/j.pcad.2020.12.007

Wilmot, E. G., Edwardson, C. L., Achana, F. A., Davies, M. J., Gorely, T., Gray, L. J., Khunti, K., Yates, T., & Biddle, S. J. H. (2012). Sedentary time in adults and the association with diabetes, cardiovascular disease and death: systematic review and meta-analysis. *Diabetologia*, *55*(11), 2895-2905. https://doi.org/10.1007/s00125-012-2677-z

Witvrouwen, I., Van Craenenbroeck, E. M., Abreu, A., Moholdt, T., & Kränkel, N. (2021). Exercise training in women with cardiovascular disease: Differential response and barriers - review and perspective. *European Journal of Preventive Cardiology*, *28*(7), 779-790. https://doi.org/10.1177/2047487319838221

World Health Organisation. (2020). *Physical activity*. https://www.who.int/news-room/fact-sheets/detail/physical-activity

World Health Organization. (2018). *Global action plan on physical activity 2018–2030: More active people for a healthier world*. https://www.who.int/publications/i/item/9789241514187

World Health Organization. (2019). *Classification of diabetes mellitus*. World Health Organization. https://www.who.int/publications/i/item/classification-of-diabetes-mellitus

World Health Organization. (2021a). *Cardiovascular diseases*. https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)

World Health Organization. (2021b). *Physical activity and sedentary behaviour: A brief to support people living with type 2 diabetes* (ISBN: 978-92-4-006274-0). World Health Organization. https://www.who.int/publications/i/item/9789240062740

World Health Organization. (2024a). Diabetes. https://www.who.int/news-room/fact-sheets/detail/diabetes#:~:text=Factors%20that%20contribute%20to%20developing,effects%20of%20type%202%20diabetes.

World Health Organization. (2024b). *Noncommunicable diseases*. World health Organization. https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

World Health Organization - European Region. (2024a). *Belgium country physical activity factsheet 2024*. https://cdn.who.int/media/docs/librariesprovider2/country-profiles/physical-activity/2024-country-profiles/physical-activity-2024-bel.pdf?sfvrsn=4aab40c9_7&download=true

World Health Organization - European Region. (2024b). *Italy country physical activity factsheet 2024*. https://cdn.who.int/media/docs/librariesprovider2/country-profiles/physical-activity/2024-country-profiles/physical-activity-2024-ita.pdf

World Health Organization - European Region. (2024c). *Romania country physical activity factsheet 2024*. https://cdn.who.int/media/docs/librariesprovider2/country-profiles/physical-activity/2024-country-profiles/physical-activity-2024-rom.pdf?sfvrsn=3a6cbf15_5&download=true

World Health Organization - European Region. (2025). *Avoidable mortality, risk factors and policies for tackling noncommunicable disease - leveraging data for impact: monitoring commitments in the WHO European Region ahead of the Fourth United Nations High-Level Meeting* (Licence: CC BY-NC-SA 3.0 IGO). WHO Regional Office for Europe.

World Health Organization - Regional Office for Europe. (2024). *European health report 2024: Keeping health high on the agenda*. World Health Organization. https://iris.who.int/handle/10665/380381

World Heart Federation. (2023). *World Heart Report 2023: Confronting the world's number one killer*. World Heart Federation. https://world-heart-federation.org/resource/world-heart-report-2023/

Wu, C. C., Bu, R. S., Wang, Y. G., Xu, C. X., Chen, Y. F., Che, L. S., & Wang, S. N. (2022). Rehabilitation effects of circuit resistance training in coronary heart disease patients:

A systematic review and meta-analysis. *Clinical Cardiology*, *45*(8), 821-830. https://doi.org/10.1002/clc.23855

Young, M. D., Plotnikoff, R. C., Collins, C. E., Callister, R., & Morgan, P. J. (2014). Social cognitive theory and physical activity: a systematic review and meta-analysis. *Obesity Reviews*, *15*(12), 983-995. https://doi.org/https://doi.org/10.1111/obr.12225

Zhao, X. Y., Forbes, A., Ghazaleh, H. A., He, Q. Y., Huang, J., Asaad, M., Cheng, L., & Duaso, M. (2024). Interventions and behaviour change techniques for improving physical activity level in working-age people (18-60 years) with type 2 diabetes: A systematic review and network meta-analysis. *International Journal of Nursing Studies*, *160*, Article 104884. https://doi.org/10.1016/j.ijnurstu.2024.104884