

Impact of the COVID-19 pandemic isolation concerning physical activity and cardiovascular health

Impacto do isolamento da pandemia de COVID-19 na atividade física e na saúde cardiovascular

Rita de Cássia Lopes de Barros¹ , Laura Bacelar de Araujo Lourenço¹ , Mayza Luzia dos Santos Neves¹ , Marília Estevam Cornélio¹ , Roberta Cunha Matheus Rodrigues¹ , Thaís Moreira São-João² 

RESUMO

Introdução: A prática regular de atividade física (AF) é essencial para a manutenção da saúde e prevenção de doenças. A COVID-19 e seu isolamento social afetaram pacientes com doenças cardiovasculares (CV) na prática dessas atividades. Desta forma, realizou-se uma revisão de escopo com o objetivo de mapear, analisar e sintetizar os impactos causados pelo isolamento da pandemia de COVID-19 na realização de AF e na saúde CV em adultos. **Métodos:** A revisão foi baseada no PRISMA-ScR. Foram selecionadas para a pesquisa a PubMed, PubMed Central, BVS/BIREME, Scopus, Web of Science, CINAHL, Biblioteca Digital Brasileira de Teses e Dissertações e bases de dados SciELO. Duas fases de busca foram realizadas: maio de 2021 e março de 2022. Foram incluídos artigos que possuíam texto completo em inglês. Inicialmente, os títulos e resumos dos documentos recuperados foram lidos e triados com base na questão de pesquisa. Um terceiro revisor foi utilizado para avaliar os desacordos por meio de reuniões de consenso. Um formulário de avaliação foi adaptado para extração de dados. O estudo foi registrado na plataforma Open Science Framework sob o DOI <https://doi.org/10.17605/OSF.IO/AH6P8>. **Resultados:** 11 artigos foram incluídos neste estudo e demonstraram que a AF regular pode ser desafiadora em ambientes de isolamento social. A maioria dos participantes era moderadamente ativa e praticava AF de baixa intensidade. O confinamento levou à limitação das atividades cotidianas, distúrbios nutricionais e diminuição da AF, contribuindo para o ganho de peso. A quarentena foi associada ao estresse e à depressão, levando a uma dieta pouco saudável. Possíveis soluções apontam para a realização de AF domiciliar, considerando a saúde basal e o estado CV. **Conclusão:** A era pós-COVID-19 e suas consequências apontam para a necessidade de planejamento de estratégias que aumentem e mantenham a AF domiciliar como medida protetora para a população em geral, considerando saúde CV, recursos e espaço domiciliar.

Palavras-chave: COVID-19, Isolamento social, Doença cardiovascular, Comportamento sedentário.

ABSTRACT

Background: Regular physical activity (PA) is essential for health maintenance and disease prevention. COVID-19 and its social isolation affected patients with cardiovascular (CV) disease. This is a scoping review aiming to map, analyze, and summarize the impacts caused by the isolation of the COVID-19 pandemic concerning PA and CV health in adults. **Methods:** The review was based on PRISMA-ScR. PubMed, PubMed Central, BVS/BIREME, Scopus, Web of Science, CINAHL, Brazilian Digital Library of Theses and Dissertations, and SciELO databases were selected to search. Two search phases were performed: May 2021 and March 2022. English-language full-text papers were included. Initially, the titles and abstracts of the retrieved documents were read and screened based on the research question. A third reviewer resolved disagreement through consensus meetings. An assessment form was adapted for data extraction. The study was registered in the Open Science Framework platform under the DOI <https://doi.org/10.17605/OSF.IO/AH6P8>. **Results:** 11 papers were included and demonstrated that regular PA could be challenging in social isolation environments. Most participants were moderately active and performed low-intensity PA. Confinement led to the limitation of everyday activities, nutritional disorders, and reduced PA, contributing to weight gain. Quarantine was associated with stress and depression, leading to an unhealthy diet.

¹ University of Campinas, School of Nursing, Campinas, (SP), Brazil.

² University of Rhode Island, College of Nursing - Rhode Island, United States.



Possible solutions point to home PA, considering the baseline health and CV status. **Conclusion:** The post-COVID-19 era and its consequences point to the pressing need for planning strategies that increase and maintain home PA as a protective measure for the general population, considering CV health, resources, and household space.

Keywords: COVID-19, Social isolation, Cardiovascular disease, Sedentary behavior.

INTRODUCTION

Regular physical activity (PA) is essential for health maintenance and disease prevention. Active behavior is also known for its beneficial effect on cardiovascular health (CVH), and the absence of regular levels of PA results in increased cardiovascular morbidity^{1,2}. The maximum levels of PA, or vigorous, as proposed by Godin and Shephard³, induce the change in maximum oxygen consumption during exertion. Maximum oxygen consumption consists of an essential prognostic index and is inversely proportional to cardiovascular and general mortality⁴.

The benefits to cardiometabolic health are due to physiological and hemodynamic responses, and biochemical markers are a precise and relevant measure for controlling and managing cardiovascular risks⁵. The practice of PA at levels recommended by the WHO can reduce, on average, up to 4.13mg/dL of blood glucose parameters and 0.21% of glycated hemoglobin (HbA1c), with more precise changes in prediabetic patients and with type 2 DM, without variation in domain and intensity, with the duration being a differential factor⁶.

Evidence that sedentary lifestyles and physical inactivity are considered one of the significant public health problems worldwide with negative repercussions on CVH is profuse. The practice of PA is regarded as a modifiable behavior and risk factor, and when performed at recommended levels (and even lower), confers substantial benefits to CVH.

In public health practice, "quarantine" refers to the separation of people or communities that have been exposed to an infectious disease. "Isolation," in contrast, applies to the separation of people known to be infected⁷. Historically, several countries have resorted to quarantine or travel restrictions as a health measure, such as the United States of America (USA) when it received travelers from West Africa during the Ebola outbreak in 2014⁷, and Singapore and Hong Kong in the face

of the severe acute respiratory syndrome (SARS) epidemic between 2002-03. The effects of these measures - in the long term - should be considered, given the potential deleterious to general, mental health, and cardiovascular risk load^{8,9}.

As methods of blocking and containing the global pandemic of COVID-19, declared on March 11, 2020, social distancing and restrictions of activities or collective quarantine of the population were imposed, following recommendations from a government or competent public authority^{10,11}. One of the most relevant consequences of quarantine was the reduction of PA practice⁸. Not only levels of outdoor PA or sports activities suffered impacts, but actions of displacement and occupational activities were also compromised¹².

Therefore, the need to adopt global surveillance measures regarding the long-term effects on CV risk load due to restrictions on PA practices was reinforced. In this sense, this study aimed to conduct a scoping review to map, analyze, and summarize the knowledge produced about the impacts caused by the pandemic isolation of COVID-19 concerning PA and cardiovascular health in young adults, adults, and middle-aged adults.

MATERIALS & METHODS

A literature review was performed following the steps preconized by the PRISMA-ScR checklist¹³. The databases, portals, and academic directories included: PubMed [National Center for Biotechnology Information (NCBI)], PubMed Central (PMC), Virtual Health Library (VHL/BIREME), Scopus (Elsevier), Web of Science (Clarivate Analytics), CINAHL full text (EBSCO), Brazilian Digital Library of Theses and Dissertations (BDTD) and scientific electronic library online (SciELO). The descriptors "Adult," "Middle Aged," "Motor Activity," "cardiovascular diseases," "COVID-19," and "Pandemics" were established. The search strategy

was structured and submitted to the adaptation of specific characteristics and syntax to expand the findings in the databases considered, with the following terms: Adult OR "Middle Aged" **AND** "Motor Activity," **AND** "Cardiovascular Diseases," **AND** ("COVID-19" **AND** Pandemics). Two search phases in the literature were performed: the first in May 2021, in a paired and blinded way, and the second, in March 2022, in a paired and independent reading. No limit on the languages of publications was set.

We included studies that evaluated the impacts caused by the isolation of the COVID-19 pandemic on the practice of PA of the young adult population (19-24 years old), adult (19-44 years), and middle-aged adult (45-64 years), with or without a previous diagnosis of cardiovascular disease(s); and documents prepared by experts with question-and-answer sessions on questions involving the practice of PA under COVID-19, as well as surveillance measures related to impending cardiovascular risk.

We also considered papers that explored the barriers related to the limitations of the practice of PA (in all its domains) and physical exercise due to the COVID-19 pandemic, raising problems, challenges, and impediments that the restrictions imposed, as well as the estimation of future prognoses on cardiovascular morbidity and mortality rates, for ordinary people (with or without a diagnosis of comorbidities or CVD) and athletes in regular training. We analyzed other approaches used in intervention programs to evaluate the practice and maintenance of PA in participants with coronary artery disease (CAD) and myocardial infarction (MI), including as mediators of the immune response.

Studies developed in any care environment or areas susceptible to PA practice in the context of the COVID-19 pandemic were accepted. There were no restrictions on publications regarding the socio-cultural context, language, or geographic location.

Since it is a scoping review and a relatively recent theme, several sources of information were considered, as papers and documents, based on the assumption of the inclusion and answer criteria to the research question. Thus, we also consider studies with cross-sectional or retrospective observational design, reviews and comment

sections, and questions-and-answers prepared by councils, organizations, or societies of experts.

EndNote Web and the free web application Rayyan - Intelligent Systematic Review were used to manage the references of the studies selected by the search strategy. The screening method is represented in figure format, using the PRISMA-ScR model¹⁴.

Data were extracted using an adapted form¹³ consisting of the following variables: author(s); journal; year of publication; country of origin; objectives; population; method; intervention/comparator and related details; outcomes; adults (aged 19-59 years); PA-related behavior change; PA frequency and duration (maximum and minimum) in a typical week; PA limiting factors; contracted COVID-19; a person with CVD or not; the number of studies. After the data extraction step, the study team examined and synthesized the information.

Then, the characteristics of the study were summarized to enable the understanding of the general aspects of the studies, as well as the main concepts and their specificities. The results were arranged in figures and tables composed of the variables of interest and submitted to descriptive statistical analysis in absolute and relative frequencies. Finally, the findings were summed up and presented with the preliminary information or results pertinent to the research theme and scientific practice.

RESULTS

The search in the databases resulted in 49 papers. After removing duplicates, the sample remained with 39 articles, initially analyzed title and abstract, considering the eligibility criteria. Four records were excluded, three for duplicity and one for already being contemplated in the first wave of searches. At the end of the reading of the sample, in which we did not use a filter by language or year of publication, we obtained a selection of 38 papers, and 18 were excluded from the reading of the title and abstract that, in this case, did not meet the eligibility criteria. To fulfill the full reading stage, the number of papers corresponded to 20. Only documents that met the inclusion criteria were included. Finally, we had

11 papers for the study of the sample, data extraction and analysis of the levels of evidence, writing, and publication of the results (Figure 1).

Characteristics of the studies

The studies included were reviews (n= 4 - 36%)^{15,16,17,18}; editorial (n= 1 - 9%)¹⁹; comments section (n= 2 - 18%)^{20,21}; observational cross-sectional observational (n= 1 - 9%)²²; controlled randomized clinical trial (n= 2 - 18%)^{23,24} and retrospective (n= 1 - 9%)²⁵.

The findings show that the 11 publications are distributed in 10 (ten) distinct journals, represented with higher significance levels by countries such as Australia (n= 2 - 18%), the United States of America (USA) (n= 2 - 18%), and Italy (n= 2 - 18%). The other countries (China, Morocco, United Kingdom, Czech Republic, and Uruguay) contributed one publication, corresponding to 9% each (Figure 2).

Regarding the thematic areas of the eleven papers, the predominant ones were global health and nutrition research and cardiovascular diseases, with 02 (two) papers each (18%), followed by

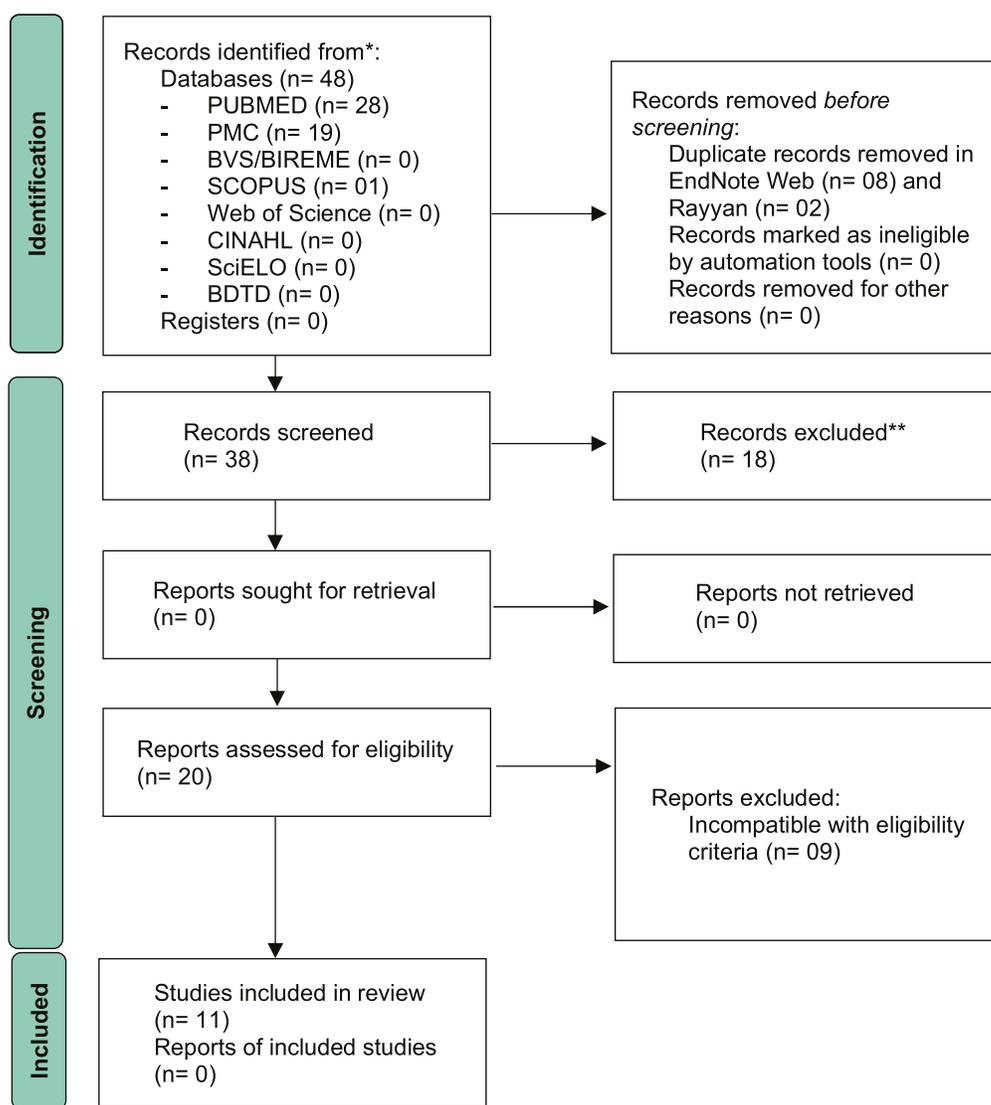


Figure 1: Flow diagram of the search and selection in the databases.

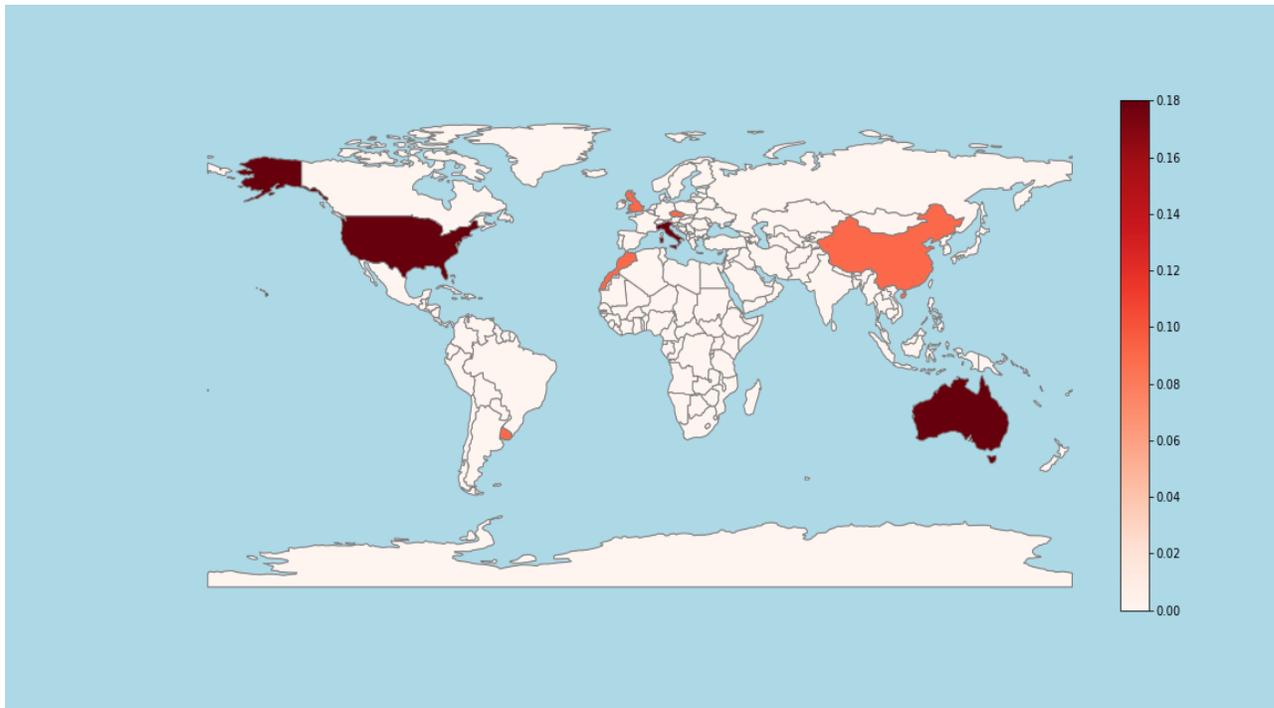


Figure 2: Geographic distribution of study sites. Study sites included Australia, the USA, Italy, China, Morocco, the UK, the Czech Republic, and Uruguay (n= 11). (Source: Barros, 2023.)

journals in the areas of hematology, HF, clinical research and CVD and nutrition (associates), with a journal that accounts for 05 (five) (10% each) papers. Of the ten journals, only one (9%) is from the nursing area (Table 1).

Table 1 presents information regarding the objectives of the studies, the populations defined and analyzed, method and details of the included studies. Regarding the goals, it was observed that seven of the 11 studies included (64%) were related to the evaluation of the change in PA levels in the pandemic scenario of COVID-19. In contrast, the others (36%) are documents that address problematic contexts that may emerge (during and after the pandemic) due to social isolation and mandatory quarantine, based on the assumption of the reduced and limited practice of PA and sedentary behavior. Regarding the sample, 03 (three) studies (27%) included patients with some CVD or after a coronary event. None of the findings were intended to directly evaluate the conduct of the nursing team or nurses in the face of PA; only one (9%) described the performance of a nurse as motivational social support

in the implementation of an intervention protocol for the promotion of PA in a participant with coronary artery disease (CAD).

PA and CVH: main findings

Among the interventions or comparators of interest for this review, the following stand out: the proposition of containment measures, such as implementing a plan to care for CV; hand the assessment of individual cardiovascular risk; the evaluation of PA used as a protective factor on coagulopathy associated with COVID-19; the assessment of the usual practice of PA through the International PA Questionnaire (IPAQ); proposition of safe practices for PA in the pandemic context of COVID-19; evaluation of the effectiveness of a program to promote increased PA in heart failure (HF) patients who report hopelessness; the assessment of the impact of home PA in patients with myocardial infarction (MI) post-hospital discharge; the comparison of PA recommendations to curb the effects of confinement; as well as the measurement of PA

Table 1

Characteristics of the included studies (n= 11). Campinas, 2021-2022.

N	Author(s)	Year	Journal	Method	Aim	Population
1	Oren O, Gersh BJ, Blumenthal RS	2020	American Heart Journal	Editorial	N/A	N/A
2	Zadow EK, Wundersitz DWT, Hughes DL, et al.	2020	Seminars in Thrombosis and Hemostasis	Review	Explore how exercise can be prescribed to influence coagulopathy and interact with pharmaceutical drugs used in people with COVID-19	N/A
3	Ma L, Xiong X, Yan L, et al.	2020	Journal of International Medical Research	Retrospective	Evaluate the effects of home exercise and PA on cardiac functional performance in patients after acute myocardial infarction (AMI) during the COVID-19 pandemic	Chinese patients who received treatment for pre-pandemic ST-elevation AMI were followed up over 6 months between March and June 2020
4	Mattioli AV, Ballerini Puviani M, Nasi M, et al.	2020	European Journal of Clinical Nutrition	Review	N/A	N/A
5	Bhatia RT, Marwaha S, Malhotra A, et al.	2020	European Journal of Preventive Cardiology	Comments section	Promoting safe participation in exercise during and after the pandemic of COVID-19 and providing a management structure for physicians caring for athletes	Sporting community
6	Mattioli AV, Sciomer S, Cocchi C, et al.	2020	Nutrition, Metabolism and Cardiovascular Diseases	Review	Analyze the effects of quarantine on lifestyle, nutrition, and PA; and the impact of new technologies	N/A
7	Vetrovsky T, Frybova T, Gant I, et al.	2020	ESC Heart Failure	Multicenter randomized controlled ongoing	Explore the effect of national quarantine of COVID-19 on PA in patients with HF	Heart failure (HF) patients (n= 26)
8	Dunn SL, Robbins LB, Tintle NL, et al.	2021	Research in Nursing & Health	Randomized controlled ongoing	Describe the study protocol of the Heart Up!	Adults with HF with moderate to severe levels of hopelessness (n= 225)
9	Boukrim M, Obtel M, Kasouati J, et al.	2021	Annals of Global Health	Cross-sectional observational	Evaluate the effect of confinement on weight load, PA and eating behavior of higher education students	Students from higher education institutions from different regions (n= 406)
10	Polero P, Rebollo-Seco C, Adsuar JC, et al.	2021	International Journal of Environmental Research and Public Health	Review	Analyze the literature to know the most recommended PA patterns to maintain fitness levels in confinement	N/A
11	Dunstan DW, Dogra S, Carter SE, et al.	2021	Nature Reviews Cardiology	Review	Gather evidence from randomized clinical trials that modified sedentary behavior; and highlight the harmful association between sedentary behavior and health	N/A

practice using an accelerometer, contrasting before and during the isolation and quarantine period.

The findings included in this review found, in a familiar way, that regular aerobic activity can be challenging in social isolation environments and that the research participants performed, for the most part, low-intensity PA and were moderately active. Confinement led to the limitation of everyday activities, nutritional disorders, and the reduction of PA, which, combined or in isolation, seem to contribute to weight gain. Quarantine was associated with stress and depression, leading to an unhealthy diet and reduction of PA (Tables 2 and 3).

Possible solutions to solve or increase outcomes related to these findings include using homemade equipment to perform PA, such as stairs and outdoor activities; online exercises can also help preserve cardiorespiratory fitness. One study recommended implementing a tailor-made exercise protocol to maximize domestic space use, considering the individual's initial health and cardiopulmonary state. In general, the studies reinforce the need to implement and maintain, during quarantine, strategies to increase home PA and encourage the support of a healthy diet (Tables 2 and 3).

Table 2

Outcomes and main implications related to PA practice on CVD and COVID-19 in review studies (n= 5). Campinas, 2021-2022.

Review studies			
N	Author(s)	Findings	Implications between PA, CVH and COVID-19
1	Zadow et al.	Corroborates the positive effects of EF on the hemostatic process. Being regularly active means having a "thromboprotective element" and being insufficiently active attenuates the fibrinolytic response and alters the response of procoagulation factors. Worse cardiometabolic health was negatively associated with COVID-19 results.	Reports of worsening prognosis requiring intensive care in people with COVID-19 and comorbidities are numerous due to the vascular system. EF acts as adjuvant therapy and at low and moderate intensities, interferes with coagulation associated with COVID-19.
2	Mattioli et al.	Chronic PA curbs oxidative stress and improves the capacity of antioxidant enzymes. Quarantine reduced PA levels, and despite the guidelines, only a portion of the people met them. Maintaining home PA is essential. After quarantine, CV risk should be evaluated along with metabolic parameters. A global action to encourage PA is recommended.	Quarantine can have a negative impact on the CVD scenario regarding healthy behaviors and anxiety, which can increase inflammatory effects on the vascular system and the risk of endothelial dysfunction. In obesity, there is an exacerbation of the burden of cardiovascular risk factors.
3	Mattioli et al.	Quarantine is associated with stress and depression, with consequent unhealthy diet and reduction of PA. During quarantine, strategies should be implemented to increase home PA and encourage a healthy diet.	Limited PA corroborated the metabolic effects that increase the CV risk load. Abrupt interruption of PA for two weeks negatively impacted physical capacity, blood pressure levels, and insulin resistance in muscle tissue, compromising CVH and muscle performance PA implies not only the reduction of body mass or the prevention of CVD, but also in the improvement of the immunological response to infectious processes, attenuating the effects on respiratory diseases. Being physically active reduces the risks of CVD and metabolic, as well as those of premature death, coronary events, diabetes, and hypertension.
4	Polero et al.	There was no consensus on PA recommendations during confinement for the general population. PA was widely recommended during confinement caused by COVID-19, especially aerobic exercises, strength, flexibility, and balance.	PA implies not only the reduction of body mass or the prevention of CVD, but also in the improvement of the immunological response to infectious processes, attenuating the effects on respiratory diseases. Being physically active reduces the risks of CVD and metabolic, as well as those of premature death, coronary events, diabetes, and hypertension.
5	Dunstan et al.	There is no adherence of adult people to the PA guidelines, and there was an increase in sitting hours (>6 (six) hours per day), which may be justified by the social, technological and lifestyle transition. Prolonged sedentary behavior was associated with an increased risk of all-cause mortality.	The act of sitting for long and uninterrupted periods affects risk and CVH. The advent of the COVID-19 pandemic has brought challenges to the global burden of CV risks that will come from physical inactivity and sedentary behavior.

Table 3

Outcomes, main implications of PA practice on CVD and COVID-19, and interventions and comparators in other studies (n= 6). Campinas, 2021-2022.

Studies of other natures					
N	Type of Survey	Authors	Outcomes	Implications between PA, CVD and COVID-19	Interventions and comparators
1	Editorial	Oren et al.	Regular aerobic activity can be technically challenging in social isolation environments. Possible solutions include the use of home fitness equipment and physical exercises, stairs, and outdoor activities. Online exercise classes can also help preserve cardiorespiratory fitness. A tailor-made exercise protocol that maximizes the use of a person's home space and the local environment can be designed, considering initial health and cardiopulmonary status.	There is a strong association between physical isolation and the onset of CVD, reinforcing the importance of PA practice given its beneficial effect on controlling glycemic and blood pressure levels, as well as maintaining body weight.	N/A
2	Retrospective	Ma et al.	The active group (n=32) performed at least 20 minutes of DE at least three times a week, opposing the inactive group (n= 46) that practiced less exercise. Baseline biological characteristics were equivalent between groups. The active group performed 30 minutes of exercise per day on four days a week, while the inactive group exercised for zero minutes on zero) days of the week.	Adherence to home-based PE and maintenance of PA are associated with improved cardiac function performance post-AMI during the COVID-19 pandemic, evidenced by increased left ventricular ejection fraction and a six-minute walk test (6MWT).	The comparison between the groups showed that brisk walking and dancing were the most frequent home PA during the COVID-19 pandemic.
3	Comments section	Bhatia et al.	This publication provided general information on COVID-19 infection and implications for CVH; questions and answers relating to 1) the EF aimed at ordinary people and athletes; and 2) aimed at guiding physicians and coaches responsible for managing and providing support to athletes.	The effects of COVID-19 on CVH are still being elucidated and there is evidence that patients with elevated troponin levels have a high mortality risk. Close monitoring is suggested before athletes (whether exposed to the COVID-19 virus) return to training activities to investigate possible sequelae of the disease.	N/A
4	Multicenter randomized controlled ongoing	Vetrovsky et al.	Gradual reduction (16%) of step count by accelerometer by an average of three weeks before and during quarantine. Patients with HF resided in apartments and with at least two other adults aggravated the deleterious effect of quarantine on daily step count.	Reduced PA levels from prolonged quarantine may have negative outcomes in patients with CVD, with emphasis on people with HF, increasing cardiometabolic morbidity and mortality. Patients with HF suddenly reduced their usual PA practice, maintaining this level for at least three weeks during quarantine. The result of such an interruption causes substantial deterioration in fitness and is a predictor of morbidity and mortality and potentially worsening the prognosis of patients with cardiac insufficiency (CI).	Unsupervised, individual outdoor walking program with combined method of weekly step goals, self-monitoring, and telephone counseling. Comparative analysis, with respect to the first three weeks prior to the start of quarantine, using pulse accelerometry.

(Continua...)

Table 3*(Continuação).*

Studies of other natures					
N	Type of Survey	Authors	Outcomes	Implications between PA, CVD and COVID-19	Interventions and comparators
5	Randomized controlled ongoing	Dunn et al.	N/A. Description of the challenges posed by the COVID-19 pandemic, and what measures will be taken to follow up the intervention.	Heart Up! is an intervention protocol, still in progress, that prioritizes the physical and mental well-being of a population considered to be at high risk, people with IHD. Adaptations have been made to Heart Up! for the context of the COVID-19 pandemic.	Intervention consisted of motivational interviewing and text messages for social support and encouragement of participants. It is expected that the treatment group will show a significant increase in the average minutes/day of moderate to vigorous PA.
6	Observational cross-sectional	Boukrim et al.	26% of the people included in the study were overweight, in a population composed of higher education students with a mean age of 20 years. 48% reported consuming fruits and vegetables (<3.5 shares/day). 93% of those with overweight had an unbalanced diet. Weight gain was related to PA intensity and stress risk, corresponding to 36%. Having a balanced diet exerts a protective factor on weight gain; and physical inactivity was the greatest risk factor for weight gain, due to the deprivation of daily activities and the limitation of PA.	The period of confinement due to the pandemic of COVID-19 altered the eating behavior of young adults, resulting in unhealthy eating habits, with a propensity for imminent CVD risk. Low levels of low-intensity PA were observed because of stress and boredom to which they were exposed.	N/A

DISCUSSION

The results indicate the predominance of Australia, the USA, and Italy in publications related to the effects of PA and sedentary behavior on the CVH in the pandemic period, containing note studies published in different journals by different authors. Such studies indicate that social isolation and CVD are strongly associated, the practice of PA is reduced, and sitting for prolonged and uninterrupted periods aggravates a possible epidemic of CV risks. Studies that assess the main obstacles to the maintenance of home PA, such as social distancing, psychic suffering due to constant exposure to periods of stress and anxiety, socioeconomic factors, and which strategies are most effective for

strengthening behaviors that reduce the potential deleterious effects on health^{15,16,18,19,21,24}.

Other countries also present significant publications for this study, such as China and the Czech Republic, where they developed studies that evaluated the benefits of home exercise in post-MI patients and people with HF, the main characteristics of cardiovascular performance among those considered active and inactive, and how the abrupt decrease in step count evidenced by accelerometry configure a scenario of long-term impairments to physical fitness, triggering worse prognoses to the general health status of patients^{23,25}. Other countries such as Morocco, the United Kingdom, and Uruguay also had significant contributions with their publications for

this study, showing us the worldwide relevance of the theme to the scientific society, expanding the nature of the perspectives of confinement on the practice of PA and cardiovascular diseases^{17,20,22}.

The findings of the studies included are related to the challenge of maintaining regular PA in social isolation environments, evidencing low or moderate levels of low/moderate intensity PA. Van Bakel et al.²⁶, in a prospective cohort, evaluated the effects of the first five weeks of lockdown on sedentary behavior and PA compared to 2018 and observed a slight increase of 13 min/day in moderate to vigorous PA practice due to time spent walking and work activities. Nevertheless, sedentary behavior increased from 7.8 to 8.9 h/day, being higher than the usual levels of PA, bringing crucial points to the worsening prognosis and recurrence of CV events, such as CVD mortality rates.

On a large scale, the effects of COVID-19 on CV morbidity and mortality have been described in "waves" since the impacts on CVH may be greater than primary infection by SARS-CoV-2, mainly due to the relaxation of restrictive measures and the restoration of economic and social activities²⁷. A limitation of the present study is precisely not to have findings that demonstrate the socioeconomic implications on CV outcomes, which have been exponentially associated with the incidence and prevalence of cardiometabolic diseases and CV^{17,19,28,29}.

In addition to the findings related to PA, nutritional disorders, stress, and weight gain were observed in this study. Social isolation as a measure of coping with the pandemic surpassed the epidemiological scenario, as well as incorporated psychological aspects and their close relationship with sedentary behavior and physical inactivity^{29,30}, which still requires more consistent elucidations, as indicated by Côrrea et al.³¹, especially in women, since the tendency to increase weight can trigger psychological distress after a long period of confinement³², as well as other mental health risks³³.

The evaluation of PA using a questionnaire has been commonly associated with objective measurement using devices, such as pedometers and accelerometers, to obtain more reliable results since the measurement by accelerometry seems to be more consistent among men about self-reported measures³⁴; which is generally not

reflected in the results of this study. Thus, it is recommended for future studies to consider the combination of both methods for the presentation of additional information with a higher level of assertiveness, and that also allows the improvement of this combined methodology.

The present study provides relevant notes on the effects of isolation measures to curb the transmission of SARS-CoV-2 and to the possible - and consequently - CV risk epidemic. To date, this is the first scoping study that gathers knowledge about the practice of PA during a public health emergency of global importance and its consequences on CVH. In addition, it brings essential surveys to national and international literature. It promotes scientific production in this sense, being a pandemic scenario, unprecedented in contemporary civilization and of wide magnitude, also described as an "extraordinary event"³⁵.

In summary, the findings of this study point to the beneficial effects of PA and its maintenance at home to mitigate the imminent risks to CVH from the mandatory quarantine imposed as a sanitary measure to contain the spread of the new coronavirus.

The findings of this study, regarding the impacts caused by the isolation of the COVID-19 pandemic and the performance of regular PA in CVH of young adults, adults, and middle-aged adults, demonstrated that it is evident that there are gaps in knowledge, which reinforces the need for future research for the study and design of feasible health interventions to increase the level of reach of the theme in several segments levels of health care, and in the context of prevention.

Scoping reviews have several limitations, some of which apply to this study. The selection of studies can be influenced by the subjective bias of the reviewers. Only some relevant literature may have been captured, and the method may be considered less rigorous compared to systematic reviews, which can lead to variations in the quality of scoping reviews. While this scoping review has its limitations, it still helps provide a broad understanding of the existing research in a particular area and identifies gaps in the literature since it allows for a systematic and comprehensive approach to gathering information from a wide range of sources.

However, this study could provide an overview of the existing research on the effects of the isolation regarding PA and CVH to facilitate and identify the gaps in the literature; and to provide an initial assessment of the breadth, depth, and relevance of the existing literature on this particular topic. Also, as an advantage, scoping reviews can be completed in a shorter time frame compared to a traditional systematic review. It can be used to inform the development of more in-depth reviews and studies.

The available evidence suggests that there was a strong association between physical isolation, as well as worsening in the prognosis of people with multiple comorbidities and that the sudden interruption of PA substantially deteriorated physical fitness, pointed out as a distinct predictor of morbidity and mortality and other clinical outcomes such as changes in blood pressure levels and insulin resistance. The involvement of home DE and the maintenance of PA in people in cardiac rehabilitation after an MI during the COVID-19 pandemic demonstrated improvement in cardiac functional performance. This scoping review showed strong evidence that the practice of PA exerted cardioprotective, metabolic, and immunological effects. In the long term, the negative repercussions will impact not only CVD indicators but also healthy behaviors and anxiety, corroborating the exacerbation of risk factors, especially regarding the practice of PA at levels appropriate for maintaining global health and CV.

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Funding

BARROS holds a Social Demand Scholarship Program - Coordination for the Improvement of Higher Education Personnel (CAPES), Ministry of Science and Technology, Brazil.

Corresponding Author:
Laura Bacelar de Araujo Lourenço
laurabalourenco@gmail.com

Editor:
Profa. Dra. Ada Clarice Gastaldi

Received: mar 30, 2023
Approved: may 30, 2023
