



# Challenges and strategies to stay physically active in the face of COVID-19 pandemic: A review

## Desafíos y estrategias para mantenerse físicamente activo ante la pandemia de Covid-19: Revisión del tema

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### SUMMARY

The pandemic caused by the COVID-19 has influenced peoples' lifestyles. Home-confinement scenario might impair physical activity practice, resulting in new challenges for maintaining health during the pandemic of the COVID-19. The aim of this study was to present the current context of COVID-19 pandemic, its impact on the practice of physical activity, and the strategies available to remain active during home-confinement according to international recommendations. The narrative review was conducted based on studies that analyzed themes related to physical activity and COVID-19. Virtual Health Library (VHL), CINAHL, Cochrane, PsycINFO, PubMed, ScienceDirect, Scientific Electronic Library Online (SciELO), Scopus, SPORTDiscus, and Web of Science databases were searched for relevant papers. Although an increased number of experimental studies are still necessary, people should devote more time to physical activity during social isolation. Guidelines were adjusted by international entities in order to encourage people to remain active, through practice regular physical activity, using alternative strategies such as fitness program applications, exergames, online exercise classes, and even chores. Reduction of prolonged sedentary behavior could contribute to maintain health and improve quality of life during the COVID-19 pandemic.

**KEYWORDS:** Coronavirus infections, health, exercise, physical activity, social isolation.

### RESUMEN

La pandemia provocada por la Covid-19 ha influido en los estilos de vida de las personas. El escenario de confinamiento domiciliario podría perjudicar la práctica de actividad física, generando nuevos desafíos para el mantenimiento de la salud durante la pandemia de la Covid-19. El objetivo de este estudio fue presentar el contexto actual de la pandemia de Covid-19, su impacto en la práctica de actividad física y las estrategias disponibles para mantenerse activo durante el confinamiento domiciliario según las recomendaciones internacionales. La revisión narrativa se realizó con base en estudios que analizaron temas relacionados con la actividad física y la Covid-19. Se realizaron búsquedas de artículos relevantes en las bases de datos Virtual Health Library (BVS), CINAHL, Cochrane, PsycINFO, PubMed, ScienceDirect, Scientific Electronic Library Online (SciELO), Scopus, SPORTDiscus y Web of Science. Aunque todavía es necesario un mayor número de estudios experimentales, las personas deberían dedicar más tiempo a la actividad física durante el aislamiento social. Las pautas fueron ajustadas por entidades

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internacionales para alentar a las personas a mantenerse activas, mediante la práctica de actividad física regular, utilizando estrategias alternativas como aplicaciones de programas de acondicionamiento físico, exergames, clases de ejercicios en línea e incluso tareas domésticas. La reducción del sedentarismo prolongado podría contribuir a mantener la salud y mejorar la calidad de vida durante la pandemia de Covid-19.

**PALABRAS CLAVE:** Infecciones por coronavirus, salud, ejercicio físico, actividad física, aislamiento social.

## INTRODUCTION

The COVID-19 pandemic has significantly changed peoples' lifestyles. While there was no recognized treatment or vaccine, the government's immediate protective measurements aimed to modify behavioral habits to reduce the risk of transmission of coronavirus' agent. This strategy consisted of severe restriction including self-isolation, living in home-confinement, and avoiding crowds, which might cause a severe reduction in the levels of physical activity (PA) practice. <sup>(1)</sup>

It is known the regular PA is essential for preserving physical and mental health <sup>(1)</sup>. Several studies highlight the beneficial role of PA in disease prevention and treatment <sup>(2)</sup>. The challenging practice of PA during quarantine and its complete interruption may unintentionally be responsible for negative health consequences <sup>(3)</sup>. For this reason, it is so important to encourage the regular practice of PA, even at home-confinement, enabling people to remain physically active during the COVID-19 pandemic. Some programs were created in order to stimulate the regular practice of PA during the pandemic, through online classes and mobile applications <sup>(4)</sup>. Nevertheless, it is perceived that very few programs offer sufficient information about the practice of PA to meet all the recommendations proposed by the health agencies.

Therefore, it is necessary to propose strategies to stimulate the practice of PA, including the type, duration, and intensity of the activity, based on health recommendations. In the present paper, we reviewed the context of the COVID-19 pandemic, its impact on the practice of PA, and the strategies that can be used to maintain the regular PA practice during home-confinement in according to international recommendations. The narrative review was conducted based on studies that analyzed themes related to physical activity and COVID-19. Virtual Health Library (VHL), CINAHL, Cochrane, PsycINFO, PubMed, ScienceDirect, Scientific Electronic Library Online (SciELO), Scopus, SPORTDiscus, and Web of Science databases were searched for relevant papers.

## COVID-19: benefits of regular physical activity in times of self-isolation

Regular PA offers several health benefits <sup>(1)</sup>. Scientific evidence often highlights the role of regular PA in the prevention and treatment of disease or clinical conditions <sup>(2)</sup>. In the case of the COVID-19 pandemic, the risk of hospitalization and mortality are increased in some patients considered as a risk groups <sup>(1)</sup>. Although there is not sufficient evidence to say that exercise has an impact on the rate and duration of acute respiratory infection, some findings associated PA-induced effects to protection mechanisms to reduce incidence of severe symptoms and hospitalization during COVID-19 pandemic. <sup>(5)</sup>

It has been shown that the practice of PA contributes to the reduction of obesity and the improvement of the metabolic profile <sup>(6)</sup>. The obesity, accompanied or not by other comorbidities, may result from high sedentary behavior and excessive calorie consumption, causing a pro-inflammatory state, which occurs due to the imbalance between angiotensin-converting-1 (ACE-1) and angiotensin-converting-2 (ACE-2) enzymes, resulting in inflammatory, oxidative, and fibrous tissue damage <sup>(7)</sup>. Interestingly, PA stimulates an overactive ACE-2 response and underactive ACE-1 response, improving the anti-inflammatory status due to higher ACE-2 activity <sup>(8)</sup>. Thus, it has been hypothesized that PA-induced ACE-2 activity might prevent severe COVID-19 e reverse the predisposing pro-inflammatory condition <sup>(9)</sup>. Additionally, PA contributes to the improvement of lipid profile, body composition, control of type 2 diabetes mellitus and reduction of arterial hypertension, improving clinical outcomes and cardiorespiratory conditioning <sup>(6)</sup>, crucial events in the prevention of severe complications and premature mortality.

SARS-CoV-2 dramatically affects cardiopulmonary function, as already mentioned. Mutually to obesity prevention, regular PA also improves cardiovascular and respiratory function <sup>(10)</sup>. PA-induced improvement in cardiovascular function is attributed to morphological

adaptations, such as an increase in heart hypertrophy, heart left ventricular dilation, blood vessel formation and redistribution, or physiological adaptations, such as an increase in heart contractile strength, early-diastolic filling to a combination of higher stroke volume and myocardial relaxation, better protection to cellular chronic stress, and lower arterial stiffness with an increase in endothelium-dependent vasodilation<sup>(11)</sup>. Together, these adaptations resulting from PA make the cardiorespiratory system more efficient, which might offer better protection or organism response to injury caused by COVID-19.

Importantly, a protective effect on the immune system might also be a response from PA<sup>(12)</sup>. Despite the few shreds of evidence, patients with severe COVID-19 experienced an overproduction of immune cells and cytokines associated with a pro-inflammatory state, named “cytokine storm syndrome”, reducing an innate adaptive immunity against SARS-CoV-2 infection<sup>(13)</sup>. Against this tendency, regular moderate PA has an innate-immunosurveillance and anti-inflammatory response mediated through innate and adaptive immune-protection, which included higher circulatory levels of anti-inflammatory cytokines, lower circulatory levels of inflammatory cytokines, increased activation, and proliferation of T-cells capacity, increased neutrophil phagocytic activity, and greater natural killer cell cytotoxic activity<sup>(12)</sup>. It is worth mentioning that high-intensity exercise can lead to acute susceptibility to upper respiratory illness, based on the “open window” theory characterized by the production of oxidants and suppression of the immune system<sup>(14)</sup>. It means that, although, increased physical fitness has been associated with a greater immune system protective effect that might reduce susceptibility to the risk of infection, caution while choosing the exercise-intensity during the COVID-19 pandemic should be considered.

There is no doubt, however, that PA acts directly on the improvement of mental health<sup>(15)</sup>. Although the effects of the COVID-19 on patients with depression and anxiety symptoms are yet to be well-described, several reports identified that mental health might be impaired during COVID-19 quarantine<sup>(16)</sup>. Routine PA prevents and reduces the depressive and anxiety symptoms<sup>(15)</sup> and promotes a greater psychosocial state<sup>(17)</sup>. This suggests that PA has a beneficial role in the improvement of psychological wellbeing and can be used as a strategy during the limited social activities imposed by home-confinement.

Based on the evidence fragments presented above, PA may be a relevant health promotion factor. To prevent the risks caused by the COVID-19, the regular PA has a major role and seems to be a good strategy to improve physical and mental health. Due to the need to keep home-confinement, the practice of PA might be impaired, resulting in new challenges for maintaining a healthy lifestyle during the COVID-19 pandemic.

### **Physical activity in quarantine time: challenges and possibilities**

Public health common recommendation by international health agencies targeted SARS-CoV-2 transmission attempting to minimize the spread of the COVID-19 pandemic among the population through home-confinement<sup>(18)</sup>. Home-confinement scenario creates an environment susceptible to spending excessive time sitting or lying down, increasing bad food intake habits, and reducing PA practice<sup>(19)</sup>. The literature indicates that even brief periods of exposure to physical inactivity and sedentary behavior have negative impacts on health<sup>(3)</sup>. The mandatory restrictions directly affected the participation in activities carried outdoors, becoming a challenge to maintain regular PA practice. Despite self-isolation limitations to PA practice outdoors or inside gyms, still there were many possibilities left for exercising at home during the quarantine, even with limited space or lack of special equipment.<sup>(1,18)</sup>

The American Physical Activity Guidelines recommend “that adults should perform at least 150 minutes of moderate-intensity aerobic BP weekly or 75 minutes of vigorous-intensity aerobic PA to gain health benefits”<sup>(20)</sup>. Furthermore, additional health benefits can be reached with the inclusion of at least two muscle-strengthening sessions and some flexibility, balance, and agility exercises in the week program<sup>(2)</sup>. Thinking about the current context, several international guidelines have adjusted these recommendations to maintain the PA level for those living in quarantine without any symptoms or diagnosis of acute respiratory illness<sup>(1,18)</sup>. The adjusted recommendations include taking short active breaks and avoiding excessive sedentary behavior, using some examples of PA that can be done at home<sup>(1,18)</sup>. To follow the recommendations the PA routine should include aerobic and strength exercises combined with respiratory, stretching, and balance/control exercises, as well as regular active interruptions during prolonged sitting time<sup>(1,2,18)</sup>. In addition, exercises involving the use of the body (upper and lower) as a means of

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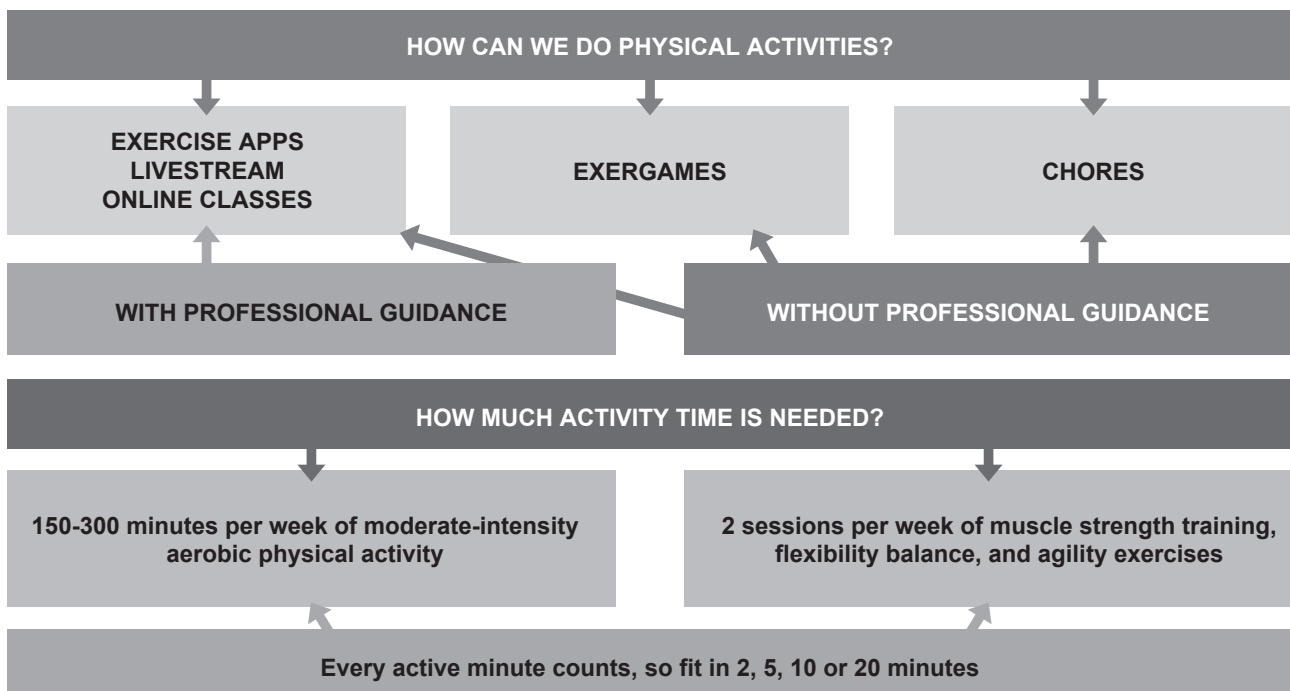
resistance to perform work against gravity, walk and / or run around the yard, dance some music <sup>(1,18)</sup>, and several other examples might be some interesting alternatives to exercising at home (table 1).

Considering the existing limitations in the process of orienting the practice of PA, in a non-face-to-face manner, it is perceived that the benefits arising from the practice outweighs the negative aspects observed. For this reason, it is recommended that people remain active during the COVID-19 pandemic period and, especially during this moment, the statement “some PA is better than none” should be considered as an attempt to stay healthy <sup>(2)</sup>. However, if the individual presents COVID-19 symptoms, the practice of PA is no longer endorsed. <sup>(1)</sup>

Interestingly, advice from the entities is to use online strategies or mobile apps during some PA practices, following the guidelines <sup>(1,18)</sup>. Although these recommendations make no specific reference to exercise volume, intensity, or frequency, the internet-delivered intervention and online exercise class through the computer or phone apps can be feasible tools for a better PA prescription and monitoring <sup>(4)</sup>. Web interaction is believed to have a capacity to improve the motivation and regularity of PA practice during the pandemic epoch. So far, a new era of PA at home is already a reality <sup>(4)</sup>, requiring efficient strategies that can be used to facilitate the regular PA practice through different media platforms.

**Table 1.** Examples of exercises for practice at home.

Classification	Examples
<b>Aerobic exercises</b>	Walking in the house, walking and/or running around the yard, up and down the stairs, skipping ropes, jumping jacks, burpees, dancing.
<b>Muscle-strengthening exercises</b>	Lifting and carrying groceries or water bottles, alternating leg lunges, stand-to-sit and sit-to-stand using a chair and from the floor, chair squats, bodyweight squats sit and squeeze a ball with your knees, up and down on tiptoes, sit-ups, planks and pushups.
<b>Stretching and respiratory exercises</b>	Yoga and Pilates on the floor.
<b>Balance/control exercises</b>	Dancing, staying up only on one leg, skipping ropes.
<b>Mixed exercises</b>	Circuit using home space and functional circuit using home objects.



**Figure 1.** Flowchart of strategies to stay active at home.



### Strategies to improve physical activity levels at home

Some strategies have been adopted to stimulate regular PA practice due to the COVID-19 pandemic, adapting practices, spaces, and methods. It is noticed that clubs, gyms, parks, and other spaces previously used to perform PA, are closed, as a strategy to avoid the crowding of people and the consequent mass transmission of COVID-19 <sup>(21)</sup>. Thus, the PA practice at home appears as a new possibility of maintaining an active lifestyle during the period of social isolation. Fitness program apps, exergames, and online exercise classes are some strategies currently adopted at home that should be more explored in an attempt to stay physically active. Some strategies have been adopted to stimulate regular PA practice due to the COVID-19 pandemic.

In recent years, a significant increase in the use of mobile fitness apps has been observed and this seems to be a new normal for exercise during quarantine. In fact, there is evidence that app-based interventions to improve physical activity and sedentary behaviors can be effective <sup>(22)</sup>. Some fitness apps, such as cycling, running, and resistance training, require gym equipment (i.e., treadmill, bike, halters), can have their programs adapted to home environment <sup>(4)</sup>. These interactive apps are strategies that stimulate the individual or collective PA practice, using real-time personalized health data <sup>(4)</sup>. Some apps provide personalized professional accompaniment to assist in the PA routine depending on subscription. The apps also provide social connection with other users, simulating outdoor scenarios and real competitions, as a strategy for increasing motivation for practice. This type of strategy can be an alternative to stay physically active while executing training programs during the pandemic of COVID-19.

Although the exergames also need an equipment support, they are a playful and enjoyable way for PA practice. Exergames are active video games that stimulate the practice of PA in different population groups <sup>(23)</sup>, reducing the perceived effort <sup>(24)</sup>, and offering mental and physical benefits <sup>(25)</sup>. Different types of PA can be performed using exergames, such as dance, running, athletics, football, volleyball, bowling, and adventure sports. Studies suggest that exergames may provide health benefits to children, adolescents <sup>(26)</sup>, adults <sup>(27)</sup>, as well as older people <sup>(28)</sup>. In fact, a previous study found that a single 20-minute session of the game Zumba Fitness at moderate intensity

enables a reduction in anxiety levels in healthy adults <sup>(29)</sup>. This finding might indicate that exergames could be a good strategy to encourage the PA practice and improve physical and mental health to practitioners of all levels and modalities.

Due to the fact that investing in a gym equipment or active videogame can be expensive; a possible alternative might be online exercise classes. During quarantine, the livestream workouts available online via free mobile apps, YouTube, and social network have increased, providing a variety of exercise options without a requirement for equipment <sup>(4)</sup>. Some examples of mobile free fitness apps with no requirements of specific gym equipment are ClassPass Live, Strava, Home Workout, 8fit, Peloton, and Nike Training Club. These apps offer a variety of types of exercise with virtual network and health metric tracking data, such as walking, running, dancing, functional exercise, yoga, and pilates. Furthermore, many gyms and fitness instructors are offering virtual classes and livestreaming to encourage people to stay physically active at home, with the possibility of a personalized prescription and monitoring training program <sup>(4,21)</sup>. Nevertheless, adequate monitoring during the exercise based on international recommendations should be considered, even by online tracking <sup>(1,18)</sup>. The prescription followed by a pre-evaluation using established protocols carried out by a fitness professional, reduces the risk of injury and maximizes the health benefits.

We recognize some people may not be interested in exercising at home, considering that some activities are monotonous or repetitive. For those, the practice of domestic PA could be a possibility to stay active and prevent sedentary behavior. Some examples of these home activities would be to perform household chores such as sweeping or washing the floor, washing the car, cleaning glass, and taking care of the garden <sup>(5)</sup>. The regular practice of such activities can contribute to the increase in energy expenditure, being an alternative way to remain active during the COVID-19 pandemic. Considering all those aspects, we can list examples of exercises that can be performed in the domestic environment, according to their specificities (table 1).

Interestingly, these findings suggest that the use of fitness mobile apps, exergames, and/or online exercise classes encourages the practice of PA. The choice of app according to the affinity with exercise seems to influence the increase in the level of PA. These strategies might be associated with other types of exercises and chores that can be done at home to

improve physical function and help people to stay physically active (figure 1).

Thus, to ensure the regular practice of PA at home, the recommendation guidelines were adjusted and, we present some domestic activities and alternative strategies such as applications of fitness programs, exercises, online exercise classes and even tasks, to encourage people to remain physically active and reduce prolonged sedentary behavior, minimizing the impact of the COVID-19 pandemic on the health of the population. Therefore, the performance of PA through a modality that raises interest and motivation could facilitate the adherence and maintenance of its practice, not only at home during the pandemic, but also at outdoor spaces, after the end of home-confinement. On that note, the use of these new PA strategies in concomitance to the standard recommendations of health agencies should be more and more in evidence in our societies, being recommended the development of future studies about the topic.

## CONCLUSION

In conclusion the COVID-19 pandemic has imposed a severe change in populations' lifestyle. Home-confinement, recommended by international health agencies as a strategy to minimize the impact of the disease, affected PA practice. It was highlighted that PA offers several health benefits and that its regular practice seems to be a good strategy to improve physical and mental health. Therefore, it is perceived that there are several challenges to perform PA during home-confinement.

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