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Editorial

COVID-19: Barriers to Physical Activity in Older Adults, a Decline in Health or Economy?

Jiao Jiao [1], Rashmi Supriya [2], Bik C. Chow [1,2,*], Julien S. Baker [2,3,*], Frédéric Dutheil [4], Yang Gao [2,3], Sze-Hoi Chan [1], Wei Liang [3], Feifei Li [3] and Dan Tao [2]

1 Dr. Stephen Hui Research Centre for Physical Recreation and Wellness, Faculty of Social Sciences, Hong Kong Baptist University, Hong Kong, China; jojojiao@hkbu.edu.hk (J.J.); anthonychan714@gmail.com (S.-H.C.)
2 Department of Sport, Physical Education and Health, Faculty of Social Sciences, Hong Kong Baptist University, Hong Kong, China; rashmisupriya@hkbu.edu.hk (R.S.); gaoyang@hkbu.edu.hk (Y.G.); emma0514@hkbu.edu.hk (D.T.)
3 Centre for Health and Exercise Science Research, Department of Sport, Physical Education and Health, Hong Kong Baptist University, Hong Kong, China; wliang1020@hkbu.edu.hk (W.L.); lifeifei@hkbu.edu.hk (F.L.)
4 Université Clermont Auvergne, CNRS, LaPSCo, Physiological and Psychosocial Stress, University Hospital of Clermont-Ferrand, CHU Clermont-Ferrand, Occupational and Environmental Medicine, 63000 Clermont-Ferrand, France; fred_dutheil@yahoo.fr
* Correspondence: bchow@hkbu.edu.hk (B.C.C.); jsbaker@hkbu.edu.hk (J.S.B.)

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Since spring 2020, in response to the global threat of the Coronavirus Disease 2019 (COVID-19) pandemic, several governments implemented emergency policies and regulations to prevent further transmission of the disease (Portegijs et al. 2021). Social distancing, isolation or lock-downs have been adopted to control the transmission and protect citizens. These regulations involve typically restricting the mobility of citizens and the closure of activity destinations. Although the measures could "flatten the curve" of new cases and minimize the infection rates, the restrictions have also had significant impacts on citizens' health and well-being due to the amplification of the barriers to physical activity (PA). The impacts may be more obvious and impactful to vulnerable populations, namely, the elderly and those with chronic medical conditions and individuals with sedentary behaviors (Marashi et al. 2021). Evidence has shown that the decline in PA could represent an increased risk of developing functional limitations and daily living disabilities (Tak et al. 2013), chronic diseases such as cardiovascular disease (Hupin et al. 2015), obesity (Zbrońska and Mędrela-Kuder 2018), cognitive decline (Shah et al. 2017), dementia (Guure et al. 2017), depression (Schuch et al. 2018) and the rate of all-cause mortality (Hupin et al. 2015). In contrast, there are numerous benefits for improving PA, which have been thoroughly reported in previous studies. The level of and engagement in PA are also associated with the economy of a country, especially from the aspects of healthcare and medication. According to a previous report from Australia, almost 7% of Australia's health burden was attributed to physical inactivity, with the main contributors being ischemic heart disease (51%), type 2 diabetes (20%) and stroke (14%) (Begg et al. 2007). The diseases usually occur in elderly adults. This indicates that elderly populations would be badly affected by COVID-19 but would also gain the most benefit from increased levels of PA. The increased PA levels would result in a decreased occurrence of the disease and facilitate a decline in future economic demands of healthcare and medication.

According to previous studies prior to COVID-19, there were some existing physical barriers for PA participation for the elderly including physical limitations such as discomfort and different kinds of pain. In addition, psychosocial barriers such as lack of motivation and lack of enjoyment also exist, in conjunction with other numerous barriers such as environmental factors and social support, etc. (Portegijs et al. 2020). During the COVID-19 epidemic, the existing barriers have been widely amplified. Many governments

have implemented measures such as lockdowns to control the spread of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). These measures have resulted in public sports and recreational facilities being forced to close. Now, as communities are returning to normal activities and more people are in the public domain more often, physical distancing is used as a common approach globally to ensure physical space between people in public areas. The rationale behind social distancing is to minimize the virus spread by avoiding crowds, group gatherings, and refraining from individual contact with one another (Nilsen et al. 2020). However, these policies have brought about an increase in sedentary behavior and relational distancing, which has resulted in a general norm for the increased physical inactivity of citizens. The impact is more apparent among vulnerable groups, such as the elderly and those with chronic medical conditions. The situation of city-wide lockdowns or restrictive access to public sports facilities has forced individuals to change hobbies and habits, and the elderly have been reported to associate with decreased activity during the COVID-19 pandemic (Suzuki et al. 2020). In addition, Yuta Suzuki's research team (Suzuki et al. 2020) found that elderly people in a relevantly more dormant state faced another physical obstacle that related to the changes in daily transportation needs.

Considering its impact on health, the environmental limitations restricted PA levels, leading to the deterioration of function or cognitive decline, which would adversely affect PA levels. As reported by Yamada's research team (Yamada et al. 2020), the total PA time decreased by 65 min per week across frailty and robust groups of older adults in Japan during the first 3 months of the COVID-19 pandemic. The decreasing rates recorded were 30% and 36.4% in frail and robust older adults, respectively. The PA decrease may indicate a deteriorating trend of physical function and disability in the future (Yamada et al. 2020). Not only physically, the COVID-19 pandemic has also induced dramatic changes in psychosocial status. The elderly and people with severe comorbidities are particularly vulnerable to the adverse consequences of COVID-19. This issue may cause considerable fear among the elderly and exaggerate other related psychological problems including increases in anxiety, irritability and excessive stress (Dubey et al. 2020). These psychological impacts on the elderly may automatically transform into a sense of self-protection awareness by confining themselves to home because they have increased concerns about being infected when contacting others. The contact may occur with close relations and friends during gatherings indoors or with strangers in crowded places in public areas. Hence, psychological stresses such as fear and anxiety are potentially perceived barriers to outdoor activities. The COVID-19 pandemic has provided a situation where a paradoxical loop has developed. This paradox relates to the fact that elderly populations are unable to conduct physical activities due to the psychological stresses or closure of faculties, simultaneously; they are unable to relieve their psychological stresses through physical activities. A summary of the barriers to physical activity of older adults amplified by the COVID-19 pandemic and the relevant effects to elderly's health and economy has been summarized in Figure 1.

In relation to the economy, healthcare and hospitalization costs may increase with increases in the age of populations and their aggravation of diseases. When the elderly become less active, they have more risk of sarcopenia, depression, dementia and Alzheimer's disease and are a majority group who are subjected to multi-morbidity with implications for proper medical care and social service support. According to a study published in 2016 examining data from the United States in 2014, non-institutionalized adults aged 50 years old and greater cost a staggering USD 860 billion annually in healthcare. This figure is amazing when we consider that four out of five of the most costly chronic conditions among the elderly can be prevented or managed by PA (Watson et al. 2016). Similarly, research conducted in the pre-pandemic period in Australia illustrated that, if the prevalence of physical inactivity in adults experienced a reduction of 10%, this would result in 6000 fewer incident cases of the disease, 2000 fewer deaths and 25,000 fewer disability-adjusted life years, which may confer a reduction of AUD 96 million in health sector costs (Cadilhac et al. 2011). Two recent studies during the COVID-19 pandemic have illustrated similar concepts that billions of dollars in global health-related expenditure could be saved by improving

the level of PA (Hafner et al. 2019; Hafner et al. 2020), since regular PA is associated with lower onset rates of different chronic diseases, such as obesity, hypertension, diabetes and dementia, etc. (Baker et al. 2021; Guure et al. 2017), when people progress in age. Although it is unrealistic to expect immediately converting health costs to savings when people become sufficiently active (Stephenson et al. 2000), the cost of pharmaceuticals might be reduced in the short term. For example, blood pressure could be reduced by 3–5 mmHg if individuals began to conduct regular moderate PA; using this scenario, the cost for antihypertensive medication would be reduced. From a long-term perspective, a large amount of savings from the reduction in cost of health care, hospitalization and medication because of physical inactivity could be used for individual services followed by economically supporting the government and healthcare providers, which would further benefit the entire society. Taking an example of Hong Kong, whose population is ageing, the total health spending from 1989/90 to 2019/20 grew at an average annual rate of 5.6% in real terms, faster than the corresponding 3.4% increase in the gross domestic product (GDP) during the same period. As a result, total health expenditure as a percentage of the GDP increased from 3.6% in 1989/90 to 6.8% in 2019/20 (Food and Health Bureau 2021) and is expected to continuously increase in the coming years. Even after the resumption of the world economy when the COVID-19 pandemic ends, the economic impacts of physical inactivity due to the barriers amplified by COVID-19 would remain. If this sedentary lifestyle in the elderly continues, the number of health-related expenditures could increase even more, which would consequently result in a heavier burden to the government in the future, as 53% of the current health expenditure was paid via government schemes, and only 30% was by household out-of-pocket payment in 2019/20 (Food and Health Bureau 2021).

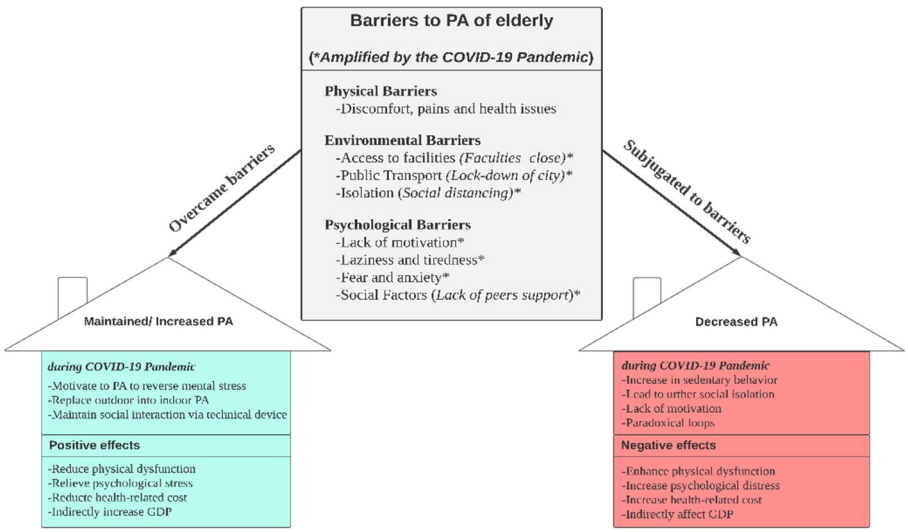

Figure 1. Summary of the barriers to physical activity of older adults amplified by the COVID-19 pandemic and the relevant effects to elderly's health and economy.

Therefore, in order to maintain health and safeguard the economy, a further initiative to overcome barriers to physical activity includes tools such as online exercise videos, apps, online platforms and telehealth media. These tools are not limited by environmental barriers and are fundamental international recommendations for maintaining mental health and physical health during the COVID-19 quarantine. There are various online group exercise classes that could be freely provided to the elderly. As recommended by The WHO Regional Office for Europe, following "online exercise classes" would be a positive way to be active as this method has demonstrated positive relevance to PA during self-isolation (Stay Physically Active during Self-Quarantine 2020). In addition, these methods for PA can help the elderly avoid the risk of being infected and encourage them to continue their physical activities within their own comfort zones and the safety of their homes. In this

COVID-19 era, older people should be made aware of web-based applications that can keep them physically and mentally fit. Web-based applications that are available for older adults include Bold, Silver Sneakers Go, Britain's National Health Service, Calm, C25K and Healthline (The Best Health and Fitness Apps for Seniors). Furthermore, we think future healthcare provision will be reliant on artificial intelligence (AI). In fact, the era of AI medication seems inevitable. Patients can use AI chatbots at home to keep track of their health plans at the simplest level. It may be possible to remove anxiety and confusion associated with seniors by using artificial intelligence applications that remind them when to take their medication, when to see their doctors and even when to eat. Social robots powered by AI can go beyond this by providing senior citizens with some level of companionship. Social robots can also nudge self-care behaviors by tailoring their engagement (Greulich-Smith 2020). In summary, despite putting the blame on governments, it is our responsibility as citizens to make use of the available technologies to protect not just the health of our elderly but also our economy. These technologies need to be realized soon and made freely available. This development would facilitate increases in PA while reducing the economic and medical burdens associated with physical inactivity.

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